MARINE REVIEW.

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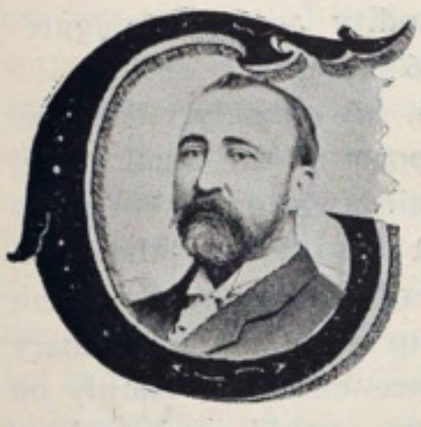
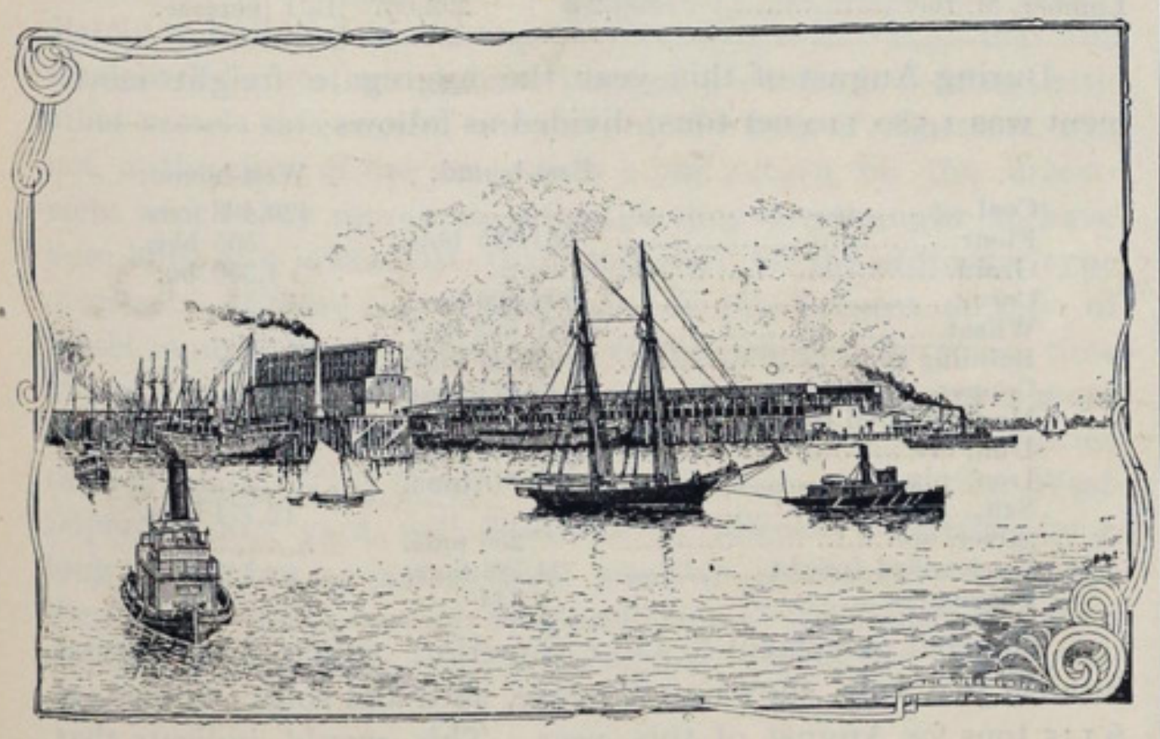
Southern Commercial Enterprise.

A FLEET OF NEW STEAM VESSELS TO RUN BETWEEN NEWPORT NEWS, VA., AND LIVERPOOL—INAUGURATION OF THE EUROPEAN STEAMSHIP SERVICE OF THE CHESAPEAKE & OHIO COMPANY.



CHESAPEAKE & OHIO is the name of a railway company that has long been connected with the commerce of the two Virginias and other important sections of the country tributary to a direct line from Cincinnati to the Atlantic seaboard at Chesapeake bay, but even among people well versed on the subject of transportation, there are few who realize the extent to which this company has built up an export business from Newport News, Va., since it was taken up by Vanderbilt interests a few years ago, with Mr. M. E. Ingalls as president, who was at that time made president also of the Cleveland, Cincinnati, Chicago & St. Louis Railroad, or Big Four. It will surprise many readers of the REVIEW to learn that for some time past, a considerable portion of the export business in flour from Michigan, Wisconsin and Minnesota has been going to the Virginia port of Newport News for shipment to Liverpool by way of the Big Four and Chesapeake & Ohio, due in part, of course to arrangements as to freight charges with the Lake Shore and New York Central roads, which are under the same control. But as regards Chicago, St. Louis and other centers of the west and southwest, this Atlantic port in Virginia with its railway connections is making strong effort for export business, and its success is best shown by the



ELEVATOR AND COAL PIERS.

inauguration last week of a European steamship service under the direct control of the Chesapeake & Ohio company.

The occasion was celebrated by an excursion from Cincinnati to Newport News on a special train, which conveyed to different points of interest around Hampton Roads a representative party of business men engaged in exporting goods from Cincinnati, Louisville, Indianapolis, Chicago, Kansas City, St. Louis and numerous other points tributary to these large cities. A representative of the REVIEW was invited upon the trip, on account of special interest in the new steel vessels, which, although built in Great Britain and registered there by the Chesapeake and Ohio Steamship Company, Limited, will form practically another line of American ships on the Atlantic.

The Rappahannock, which had reached Newport News just previous to the arrival of the excursion, is the first of six vessels, which will all be in commission within a few months. Two other besides the Rappahannock, the Shenandoah and

BOSTON
NEW YORK
PHILADELPHIA
NEWPORT NEWS
THE COASTING DISTANCES BETWEEN EACH PORT ARE SHOWN BY STRONG BROKEN LINES. 402
OTHER DISTANCES. 2580
THE DISTANCES GIVEN ARE IN NAUTICAL MILES.
NEWPORT NEWS
IS IN DIRECT TRACK OF VESSELS BOUND FROM WEST INDIES, GULF OF MEXICO AND SOUTHERN COTTON PORTS
MEXICO
SOUTH AMERICA

POSITION COMPARED TO OTHER SEA PORTS.

Kanawha, are to come from the yard of Messrs. Alex. Stephen & Sons of Linthouse, Glasgow, while the remaining three, the Appomatox, Greenbrier and Chickahominy, are being built by Furness, Withey & Co. of West Hartlepool, England. The principal dimensions of the Rappahannock and her two sister ships are, Length, 370 feet; breadth, 44 feet; depth, 33½ feet; draft, fully laden, 25 feet; tonnage, gross, 3,860 tons; tonnage, net, 2,480. The cargo capacity of these boats will be 6,785 tons. They will have fittings for 770 head of cattle. Engines are of the triple expansion type, with cylinders 28, 46 and 75 inches by 24 inches stroke of piston, supplied with steam at 160 pounds pressure. The three boats building by Messrs. Furness, Withey & Co. do not differ greatly from those already described. The principal dimensions are: Length, 345 feet; breadth, 41.25 feet; depth, 28.66 feet; draft, fully laden, 23.5 feet; tonnage, gross, 3,000 tons; tonnage, net, 1,900 tons; cargo capacity estimated, 5,000 tons; ballast (water) 520. These steamers will have fittings for 550 head of cattle. Their engines will also be of the triple expansion type, with cylinders 28, 44 and 72 inches by 48 inches stroke, and taking steam at 160 pounds pressure.

A noticeable feature in the Rappahannock was the very large size of shell and other plates used throughout the boat, but the owners of the new ships say that the shell plates in this first vessel are not near as large as those used in the three ships be-

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Chicago's Life Saving Service—Wages Question.

WESTERN OFFICE, MARINE REVIEW,
No. 701 Phoenix Building, CHICAGO, Ill., Sept. 14.

The life saving officials at the fair and those at Washington have been trying to excel each other all this year, in showing how little practical knowledge they have of the needs of Chicago's water front. The judges haye at last awarded the palm to Superintendent Kimball, who certainly deserves it, for he has shown not only a total absence of information about the twenty miles or more of the water front here, but also the aims and purposes of the life saving service. Marine men call it "the most asinine arrangement" they ever heard of, and to any one who gives it a little study it will be readily proven. The new station at the fair grounds will be made permanent. The old station at the mouth of the river will be left in charge of one solitary watchman, with a telephone to the new station, eight miles away. When a wreck occurs along the north shore, or off the harbor, he is supposed to telephone the fact to the crew. They are to hurry to the new station, and man a boat there, and go to the rescue. But it will take fully an hour for the crew to go to one station from the other, and an hour is a long time when people are drowning or boats are sinking. A tug would probably have gone to the spot and done the work before the crew were half way to the old station, or else the boat would have gone down with all on board. What a situation!

The entire water front dependent for its life savers on a fleet of tugs, that might be far away when needed! For the immediate vicinity of the fair grounds, it will be an excellent thing. But boats either stop at the river, or go to South Chicago, and in the latter case, they would keep several miles out in the lake. The only boats going along the land are the yachts and excursion steamers. Both are supposed to be in shelter before a storm. Most of the life saving in the past has been in the basin, and the rescued were in nine cases out of ten people who had been rowing in small skiffs. What good a station eight miles away would do them is hard to conceive.

Some marine men have a bad practice of hinting that there must be some interest not apparent on the surface when the steamboat inspectors take any decided action and tie up a boat for repairs, or reduce her licensed pressure. They do not seem to realize that if the local inspectors were knocked out a few times there would be little use for these officers, and that in a short time accidents and disasters would be of freqent occurence. The case of the City of Toledo here last week caused a great deal of unnecessary commotion. After a most impartial inspection of the boat's boiler, the steamboat inspectors, Messrs. Sinclair and Moore, ordered that the boiler be put in seaworthy condition immediately. The boat was at once tied to the dock, and then talk commenced. The owners thought it was a scheme of the Henry syndicate to break the charter, and came to Chicago. They incidentally brought Supervising Inspector Westcott with them Then an inspection was again made, but without either steam or pumps, and the end of the row was that the City of Toledo left that night for her home port. It is probable that when the local inspectors pass unfavorable judgment on a boat next time, it will be taken as the ultimatum, as it ought to be.

The collapse of the Seamen's Union here this week was welcomed as a great boon by vessel owners, who had become tired of the tyranny of union rule in managing their craft. The union as regards the Lake Michigan lumber fleet is now about as dead as it has been for two or three years past on Lake Erie. Thus far owners here have not asked that sailors ship for less than $1.50 a day. Of course now that the union has quit trying to maintain the wages, there will be some owners who will want sailors at $1.25. Nothing will play so completely into the hands of the union for future seasons as the reduction of wages below a reasonable figure. Vessel owners here were themselves responsible four years ago for driving nearly every able bodied sailor into the union, by not paying a reasonable rate of wages. They then thought that sailors could live for $1.25 and be idle half the time. In less than four months their shipping office was closed up, and they were at the mercy of the union. A little common sense of justice will now keep the vesselmen on top. They will be able to manage their own boats in their own way and secure far greater returns on their property. On the other hand, if, like the union when it was on top, they attempt to play the hog, in the end hey will be as bad off as they were before.

A Big Grain Carrier.

In taking 141,500 bushels of corn out of Chicago for Buffalo, Tuesday, the steamer Selwyn Eddy takes the record in corn cargoes from the E. C. Pope. The Eddy now holds the record for both wheat and corn, her largest cargo of the former cereal aggregating 139,820 bushels, Detroit to Buffalo.

The George F. Blake Manufacturing Company of 95 and 97 Liberty Street, New York, sends us a neat morocco-bound, vest-pocket note book containing engineering tables and useful information. Send for one of them and mention the MARINE REVIEW.

ONLY SIX WEEKS MORE—And the World's Columbian Exposition will be a thing of the past. Then why neglect the opportunities offered by the Nickel Plate road to reach Chicago at one fare for the round trip, September 21st and 23d.

Direct Causes of Low Lake Freights

The total movement of freight of all kinds through the St. Mary's Falls canal to Sept. 1 of this season as compared with the movement to the same date in 1892, shows a decrease of only 6.5 per cent.

In all of the leading kinds of freight, excepting coal and iron ore, the movement this year has increased.

Coal shipments are only 2.5 per cent. less than they were a year ago.

The flour movement shows an increase of 17.9 per cent.

Corn shipments are 36.9 per cent. greater than they were a year ago, while in wheat the increase is 5.9 per cent.

In lumber, also, the shipments are greater than they were a year ago, the increase amounting to 13.1 per cent.

But in iron ore, the greatest commodity as regards aggregate tonnage, there is a decrease of 18.6 per cent.

These figures, it may be said again, are entirely reliable, as they are made up from the monthly reports of the canal traffic, furnished by General Poe. They sustain two points of argument in relation to lake freights. First it is evident that, notwithstanding depression in business of all kinds, the movement of freight excepting iron ore has held up well, and an ordinary increase in iron ore shipments, which are curtailed mainly on account of an over-production last season, would not have been sufficient to bring about the payment of profitable rates to the carriers of general freight; and secondly there is proof in the conditions just noted of an overproduction of vessel capacity.

The total freight traffic of the canal up to and including August 30 of this year, as well as the movement in leading kinds of freight, is compared in the following table with figures covering the same period in 1892:

ST. MARY'S FALLS CANAL TRAFFIC.

	To Sept. 1, 1893.	To Sept. 1, 1892.	Per cent. of increase or decrease in 1893.
Freight of all kinds, net tons.	6,693,288	7,162,865	6.5 decrease.
Coal, hard and soft, net tons..	1,921,203	1,972,239	2.5 decrease.
Iron ore, net tons.....	2,616 633	3,215,271	18.6 decrease.
Flour, barrels....	3,718,614	3,054,420	17.9 increase.
Corn, bushels.....	1,507,738	945,506	36.9 increase.
Wheat, bushels.....	26,021,018	24,482,927	5.9 increase.
Lumber, M. feet.....	336,259	292,067	13.1 increase.

During August of this year the aggregate freight movement was 1,580,110 net tons, divided as follows:

	East-bound.	West-bound.
Coal.....	....	420,593 tons.
Flour.....	964,845 bbls.	565 bbls.
Grain.....	.....	4,350 bu.
Corn.....	208,400 bu.	.....
Wheat.....	4,369,885 bu.	.....
Building stone	3,047 tons.	.....
Copper..	13,671 tons.	.....
Manufactured iron....	.....	15,283 tons.
Iron, ore.....	688,840 tons.	.....
Iron, pig.....	5,067 tons.	.....
Salt.....	.....	12,771 bbls.
Silver, ore.....	255 tons.	.....
Unclassified freight.....	24,786 tons.	32,429 tons.
Passengers.....	2,744	2,916

The coal movement to Lake Superior, which is of special interest just now, shows an increase, hard and soft combined, of 6,145 tons for August of this year. This would indicate that the shippers of soft coal are now keeping up with last year's movement better than they were early in the season, as shipments of hard coal from Buffalo to all upper lake ports on Sept. 1 were only 19,723 tons in excess of the movement on the same date a year ago. The total from Buffalo on Sept. 1 this year was 1,440,070 tons against 1,420,347 tons on the same date in 1892. There is still a shortage, of course, of at least 50,000 tons in the soft coal shipments to Lake Superior, but this shortage is being decreased lately rather than increased.

CHRISTIAN ENDEAVOR DAY—At the World's Fair the 25th. Take Nickel Plate Road's one fare excursions Sept. 21st or 23d.

The Missabe Combination—Its Bearing on Freights.

As there is every reason to expect that the combination recently effected between the New York stockholders in the American Steel Barge Company, the Wisconsin Central syndicate of mine owners on the Gogebic range and the owners of some of the best properties on the new Missabe range, will result in increasing the power of these interests in the market for Bessemer ore, as well as in transportation business on the lakes, vessel owners and ore producers outside of the combination are naturally very much concerned about its policy in such matters as prices of iron ore and the construction of more vessels, which would, of course, be of the whaleback type. Although the best informed ore dealers and vessel owners of Cleveland are entirely ignorant of the extent to which the Rockefellers have been, or are now, interested in the several companies taken into the new corporation, it is generally referred to as a Standard oil concern, and there has been considerable discussion about the Standard oil policy of overcoming competition, by carrying on production of any kind at a loss when such an end is in view. This policy is hardly expected in the present case, however, as the output of ore controlled by the combination, admitting that the best of the Missabe mines will prove all that is expected of them, will not be large enough to rule a mining business that represented an investment of tens of millions before the American Steel Barge Company or the Rockefellers were heard of in connection with it. It is the opinion of most ore dealers that the new syndicate, which will have big expenses connected with its operations, will tend more to regulate and maintain a fair price for ore than to depress the market by trying to undersell competitors, who have already passed the stages of costly preliminary work in the development of their mining properties. But as the days of high prices for iron ore have passed, and only the big companies can mine at a profit, it is certain that a very large number of small mines, that have made some money in previous years, have been closed during the depression of the past several months never to resume operations again. It is also the general opinion of ore dealers, and vessel owners who are heavily interested in the ore trade, that the capitalists controlling the operations of the barge company and the new mines will not, in view of the present liberal supply of tonnage on the lakes, take immediately to building more barges. It can be safely said that the whaleback barges, which have been on a common footing with other vessels this season, on account of a lack of contracts, will not, at the close of the year, show a big return on the investment which they represent, although they are thought to have been built at a lower cost than that paid for the ordinary type of vessel. If there is prospect then of the present supply of vessel tonnage being about equal to the demand for some time to come, any capital that is to go into the consolidation is more liable to be applied to the mines, railways and terminal facilities than to boats. This is not saying, of course, that the West Superior ship yard will continue in idleness altogether for a long period, but no matter how wealthy its backers may be, they are not liable to rush recklessly into vessel building if they can find ships already built to carry their ore on the lowest possible margin of profit.

Skilled Labor in American Ship Yards.

During several years past a very large number of naval architects, draughtsmen and skilled workmen from Great Britain and other European countries have been finding employment here in the shipyards of the Atlantic coast and the lakes, but the demand for labor of this class has been fully supplied, especially since several of the large yards of the lakes have been without contracts. The same condition seems to prevail on the coast, as indicated by the following letter from a correspondent at Philadelphia of one of the English shipping journals :

"I cannot recommend any more shipyard men to come to this country looking for work before next spring. It is not expected that any more new work will be put in hand before then, and the forces are adequate at at all the yards for the contracts now under way. Next year, however, the government will award contracts for three new steel gunboats to cost in the aggregate $1,200,000, and business in other lines will surely liven up. Besides, the work of improving the Brooklyn navy yard and making it one of the most complete naval establishments in the world will be commenced next spring. The government has sold to the city of Brooklyn 27½ acres of unnecessary land from the navy yard territory for $1,208,000, and this money will be used in the improvements. Among other things the erection of twelve new shops capable of turning out battleships is contemplated. At present there are reported to be 5,500 applications for positions at this yard on file, and only 2,200 men are employed in the various departments.

Not Enough Sea Service.

After summing up some of the accidents to naval vessels within the past few years, Industry of San Francisco concludes an article on the sea training of naval officers with the following paragraph :

"No company could maintain a line of steamers if there were one-half the accidents that occur in the naval service. It may be said war vessels are heavy and unwieldy and have to perform evolutions not required in the case of merchant steamers, which is true, but when the causes of accidents are looked into, a large share of them come from a want of navigating skill and knowledge, as in the case of the Victoria and the Sultan. The fact is there is too much college and too little sea in the modern methods of educating naval officers."

Current Comment.

The skipper of the Vigilant is a Norwegian, born in Bergen in 1847, and an experienced deep water sailor, William Hausen by name.

The new draw-bridge at Flushing, L. I., is fast approaching completion. The Berlin Iron Bridge Company, E. Berlin, Conn., has a large force of men employed in finishing the draw.

Mr. E. H. Smith, who has been associated with Capt. J. B. Hall in looking after the shore interests of the American Steel Barge Company at Cleveland, has gone to Buffalo to take up a position similar to that of Capt. Hall in Cleveland.

So Say We All.—"It's a remarkable fact," said a Boston newspaper man to me yesterday, "that the dining car service on the various railroads only begins to be good when you get west of Chicago, whereas the farther east you get, the worse you are served, with one notable exception—the Nickel Plate road. I was agreeably surprised by the dining car service of the Nickel Plate road. It compares well with the best service on the western roads." That was a high compliment, and I mean to let my townsmen know of the good repute in which at least one Cleveland road is held by strangers.—Cleveland Town Topics.

After the Fair is Over—You may be sorry that you did not go when you reflect on such opportunities for reaching Chicago cheaply as are offered by the Nickel Plate road's one fare excursions. The next will be Sept. 21st and Sept. 23d. Three trains each way every day. Tickets good returning ten days.

For the Odd Fellows Columbian Demonstration—At Chicago Sept. 25th to 27th, and the special exercises at the fair grounds Sept. 25th, take the Nickel Plate Road's one fare excursions Sept. 21st and 23d. Superb new train service.

Pilgrims to the Fair—Should remember the Nickel Plate road's low rate excursions to Chicago. Nine days at the fair. Choice of three trains going and returning. One fare for the round trip, September 21st and 23d.

British charts of Lake Superior cover the entire north shore. $1.

(*Continued from Page 5.*)

ing built by Messrs. Furness, Withy & Co. In these latter vessels the plates are 60 feet long by 4 feet to 4 feet 3 inches wide. It is certainly surprising to see in any ship a strake in the midship section with only one butt in a length of 120 feet.

In the past, most of the large export business at Newport News has been handled by steamship lines with which the Chesapeake & Ohio Railway Company has held traffic arrangements, but these connections, on account of the service being irregular, have not of course, been satisfactory. The new Chesapeake & Ohio Steamship Company, limited, is organized, not for the purpose of removing this disability, but to increase the volume of traffic, through giving definite sailings and prompt exportation of goods.

Two views of the harbor, printed herewith, will give an idea of the natural advantages of the port, where the volume of export business has grown from comparatively nothing, seven years ago, until the present aggregate is about 300,000 tons per year to Europe direct. The territory drawn from by the Chesapeake & Ohio Railway covers the west and south, the greater portion of the traffic consisting of flour from Michigan, Wisconsin and Illinois mills, and also from the milling district west of the Mississippi river. Grain comes from the same territory, as well as from central Kentucky. The company is also handling in its export trade large quantities of tobacco in hogsheads from Kentucky and Virginia, and cotton from Arkansas, Tennessee and Alabama, as well as lumber and logs from off its own line and near-by connections. The cattle trade in a single year has amounted to 15,000 head. This will be doubled by having a class of vessels constructed for that particular kind of traffic.

The facilities at Newport News for handling freight of all kinds to and from vessels are second to none on the Atlantic coast. With an elevator of 1,750,000 bushels capacity, and seven very large piers for handling merchandise, coal, lumber and various commodities, and with a mean depth of water at low tide of 31 feet, the managers of the railway and steamship company are certainly not making extravagant claims when they say they are in position to give the people in the west and south a very great benefit in the matter of foreign business. Freight can be handled much more economically than at ports further north and certainly more expeditiously, and the ocean route to Europe is safer and quite as direct.

The establishment of direct communication with Liverpool and London by one system of transportation through a port of Virginia, and in a place made famous by the most stirring scenes enacted in the civil war, is a strong indication of the success attending the willingness of the southern people, who have long been at a disadvantage on account of losses sustained through the war, to assist in any movement tending towards renewal of prosperity. To the business men of the west who were guests of the C. & O. company on this excursion the most pleasing part of the trip was experienced at the Hotel Hygeia, Fortress Monroe where a banquet presided over by President Ingalls, was attended by Gen. Fitzhugh Lee, ex-Governor of Virginia, Governor McCorkle of West Virginia and other distinguished southerners. Gen. Lee is an interesting speaker and in the course of his address he touched upon the old scars without feeling. He had heard, he said, of an effort making on the part of a few western states to get up a western confederacy. His advice would be to them, don't. "I have tried it," he said, amid laughter and applause, "and I know how it is."

In another part of his address he said he had a sufficiency of riding up to his bridle reins in blood, and turning to Colonel Frank, the commandant of Fortress Monroe, he added: "This gentleman and myself were at West Point together. He fought on one side and I on the other, but that has all passed and tonight we shake hands as friends." The hands of the two men met in a firm clasp that was saluted with a round of cheers.

President Ingalls, Governor McCorkle of West Virginia, the mayor of Richmond and several other interesting speakers made addresses at the banquet just referred to, which was a very elaborate affair, but in itself only a small part of the grand entertainment provided for the guests of the railway company who were fortunate enough to receive invitations. The daylight ride down the Chesapeake & Ohio through the valleys of the Ohio and Kanawha rivers, through the canons of New river, and back, also by daylight, over the Blue Ridge and Allegheny mountains, abounds in scenery that is not surpassed in the whole country. On the return a stop was also made at White Sulphur Springs, the famous old watering place near the eastern boundery line of West Virginia, which has been the resort of wealthy southern planters and many American statesmen for half a century. Throughout the four days of travel, the shippers, who were invited on the excursion in order that they might pass judgement themselves upon the facilities for handling freight at the seaboard, were cared for in a most elaborate manner by Mr. W. P. Walker, jr., freight traffic manager, and Mr. C. B. Ryan, assistant ticket agent of the railway company, both of whom are located at Cincinnati.

The Big Newport News Ship Yard.

In connection with the inauguration at Newport News, Va., last week, of the European service of the Chesapeake & Ohio Steamship Company, a representative of the REVIEW was afforded an opportunity to visit the works of the Newport News Ship Building and Dry Dock Company, which are described and illustrated in another part of this issue. The plant certainly represents in all respects the latest engineering achievements in the way of labor saving machinery, and its facilities for turning out big steel ships are excelled by few works on the Clyde, but like the scene of idleness during July and August around the immense terminal plant of the Illinois Central Railway at the World's Columbian Exposition, the unoccupied births and silent machinery in the shops of this shipyard are a source of wonderment to the visitor. Still everything connected with the works, where 1,800 men were employed a few months ago on new ships for the Morgan line of New York and New Orleans, is kept in the best of order, and the company is even making additions to the number of launching ways, with immense cantilever cranes of Brown manufacture for handling material, and an extra large shed for bending frames and angles is also nearing completion. There has been some talk of more large ships for the Morgan line, but aside from this the managers speak of no work in view. A bid was made by this company on the latest naval vessels secured by the Cramps, and it is evidently the intention to make a strong effort for some of the naval work. The people of Newport News have great faith in the ability of Mr. C. P. Huntington, who controls the ship yard, to find contracts for more new vessels, but unless some work of a naval kind is secured, it would seem that the works are far in advance of the requirements of any merchant shipping company that would be liable to want new tonnage in the immediate future.

Iron Ore Shipments.

Shipments of iron ore from Two Harbors up to and including Wednesday, Sept. 6th, aggregated 659,087 gross tons and were divided as follows: Chandler, 325,805 tons; Minnesota, 274,460; Zenith, 4,310; Cincinnati, 9,916; Canton, 21,449; Franklin, 21,947; Hale, 1,200. Shipments of Gogebic range mines through Ashland up to and including Saturday, Sept. 2d foot up 851,000 tons, divided among the different mines as follows: Ashland, 26,465 tons; Aurora, 125,870; Colby No. 2, 33,213; Tilden, 87,247; Germania, 4,975; Iron Belt, 9,822; Montreal, south vein, 1,347; Montreal, north vein, 27,235; Eureka, 1,949; Brotherton, 14,643; Comet, 5,035: Eureka, A, 24,166; Careys, 44,214; Newport, 76,316; Norrie, 182,551; East Norrie, 68,066; Pabst, 83,353; Jack Pot, 1,651; Davis, 11,353; Sunday Lake, 17,525.

Stocks of Grain at Lake Ports.

The following table, prepared from reports of the Chicago board of trade, shows the stocks of wheat and corn in store at the principal points of accumulation on the lakes on Sept. 9, 1893:

	Wheat, bu.	Corn, bu.
Chicago	18,498,000	2,216,000
Duluth	2,342,000	.....
Milwaukee	924,000	.....
Detroit	932,000	3,000
Toledo	1,475,000	51,000
Buffalo	1,425,000	420,000
Total	25,496,000	2,690,000

At the points named there is a net increase for the week of 78,000 bushels of wheat and 467,000 bushels of corn.

Around the Lakes.

A. P. Wright has been made manager of the new Eastern elevator, Buffalo.

Steamer Yuma of the Wilson line, Cleveland, loaded 114,734 bushels of wheat at Duluth a few days ago on a draft of 14 feet 5 inches forward and 14 feet 9 inches aft.

Two lake vessels, the steel steamers Centurion and George W. Gould, of Port Huron and Detroit respectively, were assigned official numbers by the bureau of navigation last week. The Centurion's tonnage is 3,401.81 gross and 2,728.48 net and her official number is 126,994. The tonnage of the Gould is 2,237.36 gross and 1,790.24 net and her official number 82,267.

A notice from the light-house board announces that a fixed white lens-lantern light has been established and will be maintained until further notice, by the United States engineers for triangulation purposes on the structure recently erected in 3½ feet of water near the mouth of the old cut, and about 800 feet northwesterly from the range line marked by the St. Clair Flats range lights, Lake St. Clair. The light is shown at a height of 20 feet from a pole rising from a platform 6 feet above the water supported on a cluster of piles.

In General.

The German government has arranged for a competition among German builders for the construction of a series of torpedo boats with a minimum speed of twenty-four knots. Anim-portant object of the competition is to determine the value of the tubulous boilers used by Thorneycroft.

The Journal of the American Society of Naval Engineers, which is supported by engineers of the United States navy, compliments the MARINE REVIEW by reprinting from its columns in full the summary of proceedings of the engineering congress held in Chicago during the closing days of July.

A report has finally been made by the board of ordnance officers appointed to consider the different types of submarine torpedo boats recently submitted in accordance with proposals called for by the navy. The board, after examining at Chicago the Baker boat, built some time ago at Detroit, refused to reconsider its first action favorable to the Holland boat and has accordingly favored the adoption of the latter.

Messrs. Caird & Co. of Greenock, Scotland, have just finished the steamer Japan, which is the thirty-fourth vessel built for the Peninsular and Oriental Steamship Company. The total tonnage of these vessels amounts to 160,000 tons. Since the commencement of 1887 no fewer than thirteen vessels, of an aggregate tonnage of 61,800 tons, have been added to the Peninsular and Oriental fleet, all of which have come from Messrs. Caird's yard. The Japan is a vessel 397 feet by 45 feet by 31 feet, and will carry a dead-weight of 5,500 tons.

In referring to the Belleville tubulous boiler being put into the new passenger ships of the Northern Steamship Company, Industry of San Francisco says: "Either Mr. Hill is ahead in his plans, or else is venturing upon an experiment that may cost a good deal, but judging from his past history the former conclusion is the safe one. He built a railway "on business principles," as he expressed it, and is, no doubt, having his steamers built in the same way. Competing lines have drifted into a profligacy of management, or of financiering rather, that leaves the Great Northern railway a wide margin of profit when there is a deficit on the other lines."

Overboard With the Bucket.

The captain of a large steamer was once filling up his crew for a long voyage when a seaman came up and said, "I want to sail with you, sir."

"All right, my man," replied the captain. "Where have you sailed before?"

"P. and O., sir, to Australia."

"What countryman?"

"An Oirishman," was the ready response.

"Well, you must get a character."

The discharge was obtained, and as the Irishman was presenting it another seaman came up, and said he wanted to join. "What line were you on before?" asked the captain.

"Cunard, sir."

"What countryman?"

"English, your honor."

"All right. Go forward."

Shortly after, as the two were swilling the decks in a heavy sea, the Englishman was swept overboard, bucket and all. Unmoved, Paddy finished his job and then went to the captain's cabin. "Come in," responded the officer to his rap. "What's up now?"

"Do you remember Bill Smith, the Englishman and Cunarder?" queried Pat.

"Certainly, my man."

"You took him without a character?"

"I believe so, what of that?"

"Well, he's gone overboard wid your bucket."—Noah's Times.

Trade Notes.

The American Ship Masters' Association, No. 37 William street, New York, classed the following vessels recently: American three masted schooners Asenath A. Shaw, Belle Wooster and Melissa A. Willey; American barge C. R. R. of N. J. No. 11; American barks Doris Eckhoff, Fantee and Hudson; American half brig Lucy M. Snow, and British schooners Bess, Karslie and Lizzie Wharton.

So far as is known, the largest stick of ship timber ever gotten out near the lakes is a piece 72 feet long and 42 inches diameter scale, containing 6,498 feet, board measure, and weighing over eighteen tons. It is now at the mill of W. C. Stiles, manufacturer of ship timber, Warren, O. The capacity of this mill is 20,000 feet per day, and anyone in need of timber will be supplied with a statement of sizes in stock if they will address a postal request to Mr. Stiles.

The Bethlehem Iron Company, South Bethlehem, Pa., has forged and furnished the shafting, cranks, and other heavy forgings for the cruisers and battle ships San Francisco, Cincinnati, Columbia, Monterey, Philadelphia, Olympia, Minneapolis, Oregon, Massachusetts, Newark, Detroit, Maine and Indiana, and the armor for the following ships was made or is being made at their works: Puritan, Monterey, Monadnock, Texas, Oregon, Terror, Massachusetts, Maine, Amphitrite and Indiana. The attention of lake ship and engine builders might be called to the fact that forgings and armor were shipped to San Francisco for the naval vessels built there. When in the market for heavy forgings, lake builders will find it to their advantage to send specifications to the Bethlehem company and get figures.

Oh! that Smokestack!

The Yankees built a cruiser, the New York is her name,
They're going to build another to perpetuate their fame;
And she will have a smokestack one hundred feet in height,
Oh! where will be that smokestack, when she goes out to fight!

The New York steams her twenty, not any more, per hour,
The Brooklyn with her smokestack will do her twenty-four;
Perhaps it is a "Cramper," to draw it fairly mild,
For to such it takes a little time to get quite reconciled.

Oh! where are we poor Britishers, when such a rare device
Can not at once be "pirated"—'twould be well worth the price.
For every foot of smokestack means half a knot or more;
I guess that with that smokestack we Britishers would score.

Now where are our professors, that this secret should remain
For Yankees to discover while we rush about in vain,
And spend our money building ships so long, and of such beam;
While the Yankees with their smokestack have found the proper scheme?—Fairplay of London.

MARINE REVIEW.

DEVOTED TO THE LAKE MARINE AND KINDRED INTERESTS.

Published every Thursday at No. 516 Perry-Payne building, Cleveland, O.
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The books of the United States treasury department contain the names of 3,657 vessels, of 1,183,582.55 gross tons register in the lake trade. The lakes have more steam vessels of 1,000 to 2,500 tons than the combined ownership of this class of vessels in all other sections of the country. The number of steam vessels of 1,000 to 2,500 tons on the lakes on June 30, 1892, was 321 and their aggregate gross tonnage 534,490.27; in all other parts of the country the number of this class of vessels was, on the same date, 217 and their gross tonnage 321,784.6. The classification of the entire lake fleet is as follows:

Class.	Number.	Gross. Tonnage.
Steam vessels	1,631	763,063.32
Sailing vessels	1,226	319,617.61
Canal boats	731	75,580 50
Barges	69	25,321.12
Total	3,657	1,183,582.55

Tonnage built on the lakes during the past five years, according to the reports of the United States commissioner of navigation, is as follows:

	Number.	Net Tonnage.
1888	222	101,102.87
1889	225	107,080.30
1890	218	108,515.00
1891	204	111,856.45
1892	169	45,168.98
Total	1,038	473,723.60

ST. MARY'S FALLS AND SUEZ CANAL TRAFFIC.

	St. Mary's Falls Canal.			Suez Canal.		
	1892.	1891.	1890.	1892.	1891.	1890.
No. vessel passages	12,580	10,191	10,557	3,559	4,207	3,389
Ton'ge, net regist'd	10,647,203	8,400,685	8,454,435	7,712,028	8,698,777	6,890,014
Days of navigation	223	225	228	365	365	365

Entered at Cleveland Post Office as Second-class Mail Matter.

MR. DALZELL introduced in the House of Representatives, a few days ago, a bill that seems worthy of the support of manufacturers of steel for marine boilers, as well as builders of such boilers. It provides in substance for tests of plates and other boiler material at the steel mills instead of the present requirement that such tests be made within the inspection district where the boiler is built. The bill seems reasonable enough, but Gen. Dumont of the inspection service is said to have been opposed to such a change in the past, on the ground that there is danger of poor service, or possibly dishonest service, from inspectors who might be entrusted with the work, on account of intimate relations that would be liable to grow between the inspector and the steel manufacturers. This opposition does not, however, seem well founded. If the classification societies of this and other countries, entrusted by underwriters with the important work of classistying steel ships, can find men worthy of similar duty and faithful in their work, it would seem that a government service as important as the board of steamboat inspectors could devise methods by which these tests could be properly made in the steel works. The inconveniences and extra expenses suffered by the makers of steel and boilers, on account of the present method of enforcing this law, should be given consideration.

AGAIN this year a wide and deep centerboard sloop yacht, the Vigilant, after the type of successful American cup defenders of former years, and with an immense spread of canvas, is to meet the British challenger for the much coveted American cup. Lord Dunraven's Valkyrie, the British yacht, is, of course, of the loaded keel cutter type, and again these different styles of model will figure largely in comment pertaining to the contest, which will wax warm on both sides of the Atlantic until the closing days of the present month. The New York Yacht Club's selection of the Vigilant, after the trial races that closed on Monday last, meets with general approval here, and the Valkyrie had already been pronounced the best type of British skill. Both boats are called flyers in all kinds of weather, and the races will undoubtedly create more interest than any of the similar events in years past.

ALTHOUGH the Lucania, the second big Cunard liner, has beaten the best maiden record from Queenstown to New York, it does not seem as though the British owners of these famous ships are to see their hopes realized in the matter of speed across the Atlantic. It is certain that far more than the Campania has as yet shown was expected of her. Both boats have beaten maiden records, but the Campania was expected to eclipse the unexcelled voyage of the Paris, 5 days, 14 hours and 24 minutes, on her second if not on her first trip. The Lucania's time is 5 days, 15 hours and 37 minutes. The daily runs were: 228, 460, 490, 498, 516, 533 and 284; total 3,009 miles. The average number of knots per hour is 20.5. The best daily run—533 miles—does not equal that of the Campania, which ran during one day in her June voyage to this country, 548 miles.

A GREAT many bills of importance to the shipping interests have been introduced in both houses of Congress during the past few weeks, but none of them will be acted upon during the present session. But it would seem that a great deal of valuable time could be saved if the committees would now take up their work on these measures. There are several valuable and active members of the committees on commerce from both houses, who might be induced to bring about a beginning of committee work that would greatly facilitate matters when the general business session begins.

MESSRS. Samuels and Norton of the Marine Journal, No. 32 State Street, New York, are managers of the excursions to be given on the ocean going steamship Olivette during the international yacht races. The Olivette will follow the yachts over the course each day, beginning September 28, carrying only half the number of persons allowed by law. The fare for each day will be $5, or for all the races $15.00. State room accommodations and luncheon can be secured on the boat. Anyone visiting New York during the races will find the Olivette a good boat from which the sport can be witnessed.

U. S. ENGINEER OFFICE, Hickox Building, 185 Euclid ave., Cleveland, Ohio. August 28th. 1893. Whereas navigation is obstructed and endangered by the wreck of the schooner Pelican lying off Ashtabula Harbor, Ohio, notice is hereby given that it will be removed by the United States under authority of law.

Sealed proposals for the removal of said wreck will be received at this office until 2 o'clock, p. m., standard time, of Friday, September 15th, 1893, and then publicly opened. Specifications, blank forms, and all available information will be furnished on application to this office.

The following is the law under acts of Congress approved June 14, 1880, and September 19, 1890, respecting the removal of wrecks:

"An act making appropriations for the construction, repair, completion and preservation of certain works on rivers and harbors, and for other purposes."

Sec. 4, * * * Such sunken vessel or craft and cargo and all the property therein when so removed shall, after reasonable notice of the time and place of sale, be sold to the highest bidder or bidders, for cash, and the proceeds of such sales shall be deposited in the Treasury of the United States to the credit of a fund for the removal of such obstructions to navigation, under the direction of the Secretary of War, and to be paid out for that purpose on his requisition therefor. The provisions of this Act shall apply to all such wrecks whether removed under this Act or under any other Act of Congress. Such sum of money as may be necessary to execute this section of this Act is hereby appropriated out of any money in the Treasury of the United States not otherwise appropriated, to be paid out on the requisition of the Secretary of War." Approved June 14, 1880.

Sec, 8. That all wrecks of vessels and other obstructions to the navigation of any port, roadstead, harbor, or navigable river, permitted by the owner thereof or by the parties by whom they were caused to remain to the injury of commerce and navigation for a longer period than two months, shall be subject to be broken up and removed by the Secretary of War, without liability for any damage to the owners of the same." Approved September 19, 1890. JARED A. SMITH, Lieut. Col., Corps of Engineers, U. S. Army.

World's Columbian Exposition.

THE BATTLESHIP ILLINOIS—A COUNTERPART OF THE U. S. INDIANA AND MASSACHUSETTS—TYPOGRAPHICAL MODEL OF THE NEWPORT NEWS SHIP BUILDING AND DRY DOCK COMPANY'S YARD—A POWERFUL SEARCH LIGHT—LIGHT-HOUSE DEPARTMENT EXHIBITS.

Outside of the transportation building exhibits, considered as one, there is no other exhibit that attracts more attention in the marine line than the U. S. war ship Illinois, a correct representation and duplicate of the battle-ships Indiana and Massachusetts, as far as outward appearance and arrangement above water line are concerned. It seems almost a pity that there are no boilers and engines and that she cannot steam up and cruise around the lakes. It cost over $100,000 to build what appears to be a fine example of naval architecture, but really is nothing more than a scare-crow war ship, excepting that her armament is correct and is the same in every particular, as her sister ships, built and building by the Wm. Cramp & Sons' Ship and Engine Building Company, Philadelphia, Pa. A description of the exhibits in the ship was included in the World's Fair edition of the REVIEW, June 29, 1893, and are further commented on this article. A description of the Indiana or Massachusetts, which the Illinois was built to represent is given below, and accompanying this issue will be found a lithograph supplement, showing primarily the Illinois, but delineating as well her sister ship, the Indiana.

The battle ship Indiana, launched at Philadelphia, Feb. 28, 1893, was the first of the three coast-line battle ships authorized by act of congress approved June 30, 1890, appropriating for the construction of three battleships at a cost not exeeeding $4,000,000 each. Contracts were awarded to Cramps for two of them, at a contract price of $3,020,000 each, to be finished within three years. The vessel is of great fighting power united with adequate protection, able to take the sea in all weathers, and with draught suited to work in our shallow harbors. The hull is protected by belts of heavy armor 7½ feet wide, turned in forward and aft to sweep round the bases of the armored redoubts. Forward and abaft this belt are heavy underwater protective decks, sloping at the sides to 4½ feet below the water. There is also an armored deck over the belt. Coal bunkers are worked over the belt deck, and belts of water-excluding material are worked on the slopes of the armor deck forward and aft. Above the belt armor and extending from redoubt to redoubt, the side is protected by five inches of steel. The vessel is cut up forward, making a powerful ram bow, and doing away with excessive bow waves, on account of the easier lines so obtained, as well as greatly adding to the maneuvering power.

Her length on the water line is 348 feet; breadth extreme, 69¼ feet; draft, forward and aft, 24 feet; displacement, 10,200 tons; maximum speed, 16.2 knots; sustained sea speed, 15 knots. The vertical keel is 20 pounds with 4 by 4 inch angles of 13-pounds on the lower edge, and 3 by 3½ inch angles of 8 pound on the upper edge. The flat keel plates are: Outer, 30 pounds; inner, 25 pounds. The stem, stern posts, struts and rudder frame will be made of cast steel or the best hammered scrap iron. The transverse frames are spaced 4 feet apart in the double bottom and 3½ feet at the ends. From armor shelf to keel the frame angles are 5 by 3½ inches of 12 pounds per foot; the reverse angles 4½ by 3 inches of 10 pounds per foot, with bracket plates of 15 and 13 pounds and lightened plates of 12½ pounds. The outer angle is continuous, the reverse frame angle being in short lengths between the longitudinals. The water-tight floors are of 12½ pounds, with 3½ by 3 inches of 8-pound box angles. Before and abaft the double bottom, and below the protective deck the frames are made of channel or Z-bars 6 by 3½ by 3½ inches, of 15 pounds per foot, with 12-pound bracket plates. Above the side armor and the protective deck at the ends, the frames are 6 by 3½ by 3½ inches of 15 pounds, with alternate frames of the same size in wake of the casemate armor. The longitudinals are generally of 17½-pound plates, with 8 pound angles on the outer edges and 7-pound angles on the inner edges; the third longitudinal, which is water tight, however, is of 20 pounds and the shelf plate of 25 pounds. The main deck beams are of 10 by 3½-inch angle bulbs of 27 pounds per foot; the berth deck beams of 9 by 3½ inches of 22-pound angle bulbs, increased to 24 pounds where coming under armor; the protective deck beams of 9 by 3½ inches of 24 pounds per foot; the platform beams of 10-pound angles or 11-pound channel bars; the superstructure deck beams of 9 by 4 inches of 23⅓ pound bulbs; the bridge beams of 9 by 3½ inches of 21.8 pounds angle bulbs. The bottom plating for a length of 230 feet amidships is 25 pounds per square foot up to the water line; forward and abaft there limits it is 23 pounds. Above the water line it is 18½ pounds throughout, thickened wherever necessary on account of the chafe of the anchors, blast of guns, etc. The flat keelson plate is 15 pounds; the inner bottom, as far as third longitudinal, 14 pounds per square foot, thence to armor shelf 10 and 7½ pounds per square foot. There is a middle-line bulkhead of 12 and 10 pounds per foot, well stiffened horizontally and vertically, between the two engine rooms and the fire room on each side. The vessel is divided into a great number of water-tight compartments by means of longitudinal and transverse bulkheads of 10 and 12 pound plates. The decks are all plated over with plates not less than 12½ pounds to the foot, and the main and superstructure decks are covered with 3-inch deck planks. The armour plate and forgings for both the Indiana and Massachusets were made by the Bethlehem Iron Company, South Bethlehem, Pa. There is a water-line belt 3 feet above and 4½ feet below the water line of 18-inch armor. Rising from this at each end are armored redoubts of 17 inches in thickness extending above the main deck 3½ feet, giving an armored freeboard of 15 feet 2 inches. These redoubts protect the turning gear of the turrets and all the operations of loading. The turrets are inclined, 17 inches thick, powerfully strengthened. The horizontal thicknes of the turrets is 20 inches. The side armor belt is backed by 6 inches of wood, two ¾-inch plates, and a 10-foot belt of coal. The vessel above the belt has 5 inches of armor protection. The 8-inch guns have barbettes of 10 inches, inclined turrets of 8½ inches, and cone bases and loading tubes of 3 inches. The 6-inch guns are protected by 5 inches of armor and have 2-inch splinter bulkheads worked around the deck, inside of which the amunition of these guns is set up. The 6-pounders, where mounted between decks, have 2-inch armor worked around them; elsewhere they have the usual service shields. The 1-pounders are protected by two inches of steel. The deck over the belt is 2¾ inches, and at the ends the underwater decks are 3 inches. These decks are made up of two thicknesses of ½-inch mild steel plates, with the remaining thickness all in one plate of steel armor. There is a 10-inch armored conning tower, with a 7-inch tube for protecting the voice pipes, electric wires and steering connections.

The propelling machinery is capable of developing, when forced, 9,000 indicated horse power, and under ordinary conditions 8,000. There are two propellers. The main engines are inverted, vertical, direct-acting, triple-expansion, with cylinders of 34½, 48, 75 inches in diameter and 42 inches stroke, and it is estimated that at a piston speed of 9,000 feet per minute, or 129 revolutions, the horse power will be 9,000. Each engine and its auxiliaries is separated from the other by a fore-and-aft water-tight bulkhead, so that in case of accident to one engine the other would not be affected. The main valves are of the piston type, worked by Stephenson, double-bar links; one valve for each high pressure cylinder, two for each intermediate and four for each low-pressure cylinder, the diameter of all the valves being 17 inches. The intermediate and low-pressure cylinders are steam jacketed at sides and bottom, the high-pressure ones have linings, but are not jacketed. The framing consists of an inverted Y-column at the back of each cylinder and two forged steel cylindrical columns at the front. The engine-bed plates are of cast steel supported on wrought steel keelson plates which are built in the ship. The piston rods, valve stems and all working rods are of mild forged steel; the pistons are of cast steel.

The crank shafts are of mild forged steel. They are in three sections, which are reversible and interchangeable with each other and with those of the other engine. They are 14 inches in diameter in the journals and 15 inches in the pins, and have axial holes of 6 inches in diameter through the former and of 6½ inches through the latter. There is a separate condenser for each engine, made with cast brass heads and shell. The heads are seven-sixteenths inch in thickness and will contain all the nozzles for steam and water openings. The diameter is 5 feet 9 inches, and length between tube sheets, 10 feet 3 inches. Each condenser contains 3,788 seamless drawn brass tubes, five-eights inch outside diameter, giving 6,353 square feet of cooling surface on the outside. Condensing water is supplied each condenser by a centrifugal circulating pump capable of discharging 9,000 gallons of water per minute from sea or bilge. The air pumps are of the Blake vertical type, with two steam cylinders 12 inches in diameter, and two water cylinders 25 inches in

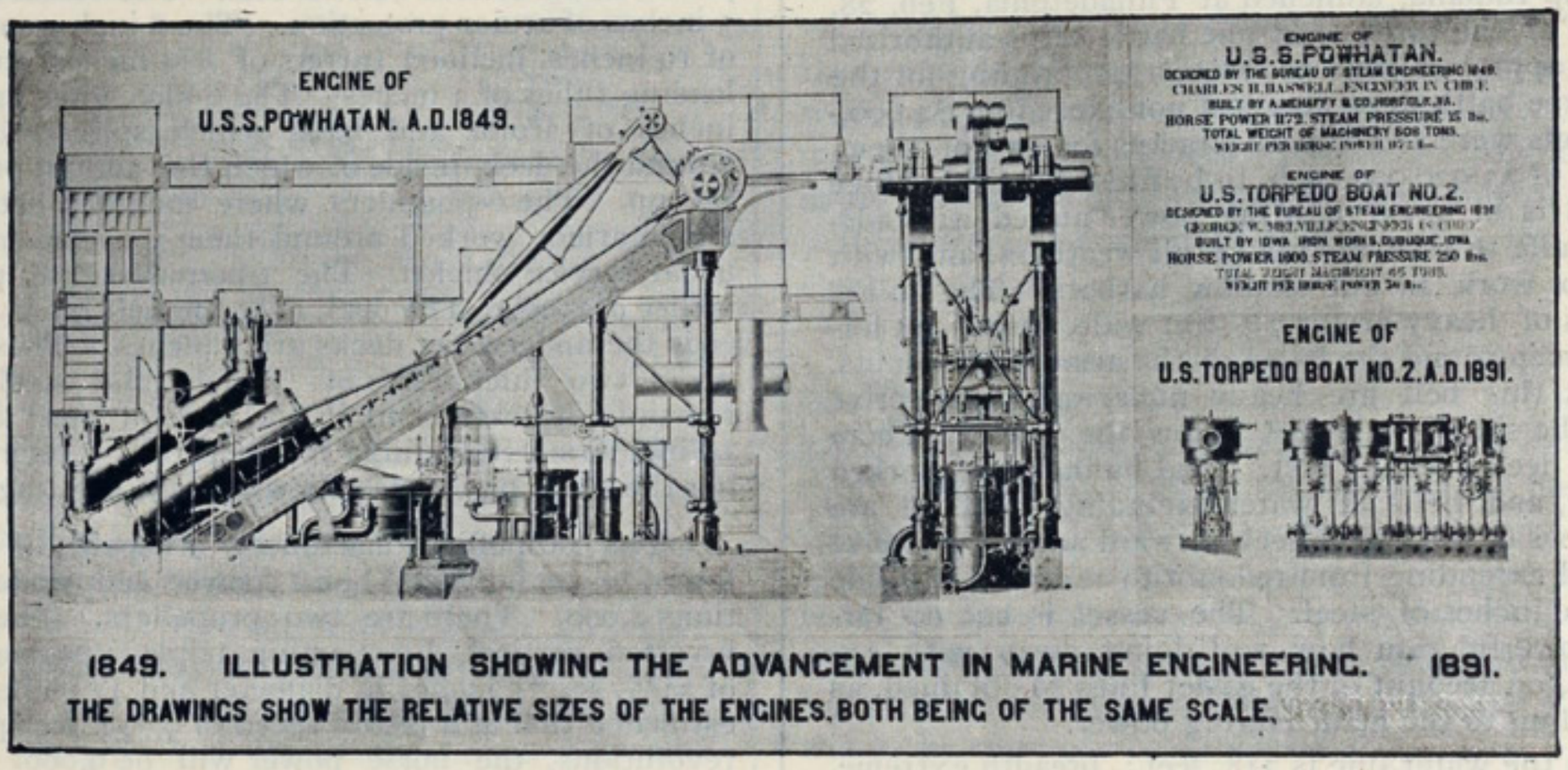
diameter, the stroke being 18 inches. The steam and water pistons on each side are on the same rod, and the two rods are connected by links to a vibrating beam, pivoted in the center. The valve gear of the steam cylinders is driven from a pin on the beam near the center. These pumps are similar to those on the New York, which on the preliminary trials gave great satisfaction.

There are four main and two auxiliary boilers, made of mild steel, of the horizontal, return, fire-tube type, and intended for a working pressure of 160 pounds. The main boilers are 15 feet outside diameter and 18 feet long, double-ended and with shells $1\frac{19}{64}$ inch in thickness. Each boiler contains eight corrugated steel furnaces 3 feet internal diameter. The tubes are lap-welded steel, 2½ inches outside diameter; the ordinary ones No. 12, B. W. G., and the stay tubes No. 6, B. W. G., in thickness. The main boilers have about 17,240 square feet of heating surface and about 552 square feet of grate; the auxiliary boilers are the same as those designed for the New York and contain 1,953 square feet of heating surface and 64 square feet of grate. The main boilers are arranged in groups of two, with two smoke-pipes. The auxiliary boilers are above the protective deck. The ship is intended to cruise under very light forced or natural draft, and has been given large heating surface for this reason. The two propellers are of manganese bronze, with adjustable blades, and the coal capacity is 1,800 tons, which will carry the ship 16,000 miles at a 10-knot speed.

Her complement will be 460 men all told. Among the auxiliary machinery is an Allen dense air machine manufactured by H. B. Roelker, New York, N. Y., and the blowers for the induced draught were furnished by the B. F. Sturtevant Co., Boston, Mass.

torpedo boat No. 2, building at the Iowa Iron Works, Dubuque, Iowa, which are contrasted with the machinery of the Powhatan, are quadruple expansion, with cylinders 11½, 16, 21½ and 30 inches by 16 inches stroke, having 1,800 nominal horse power and using steam at 250 pounds pressure. The total weight of this machinery is 45 tons, the weight per horse power being 56 pounds. The dimensions of the torpedo boat are 150 feet over all, 15½ feet beam and 4 feet 9 inches draft, the displacement being 120 tons. It is expected that a speed of 22.4 knots will be developed by the torpedo boat. Drawings of the boilers and machinery of the Indiana and Massachusetts described above are also shown. The naval academy at Newport, R. I., is represented by an exhibit of class books, examination papers and a small engine constructed by students. The regular course is six years and then there are post-graduate courses.

The greatest feature of interest in the ordnance bureau display is the torpedoes. The Howell automabile torpedo shown is 14 inches diameter and nearly 11 feet long. When charged it weighs 500 pounds. The power is geared to a pair of screws having a speed of 6,000 revolutions. The fly-wheel power will carry the torpedo a quarter of a mile in less than a minute. Another torpedo shown is controlled by an electric cable and can be exploded at will. The bureau of navigation has cognizance of all that relates to the promulgation and enforcement of the secretary's orders to the fleet and to the officers of the navy, the education of officers and men including the naval academy and technical schools for officers, the apprentice establishment and

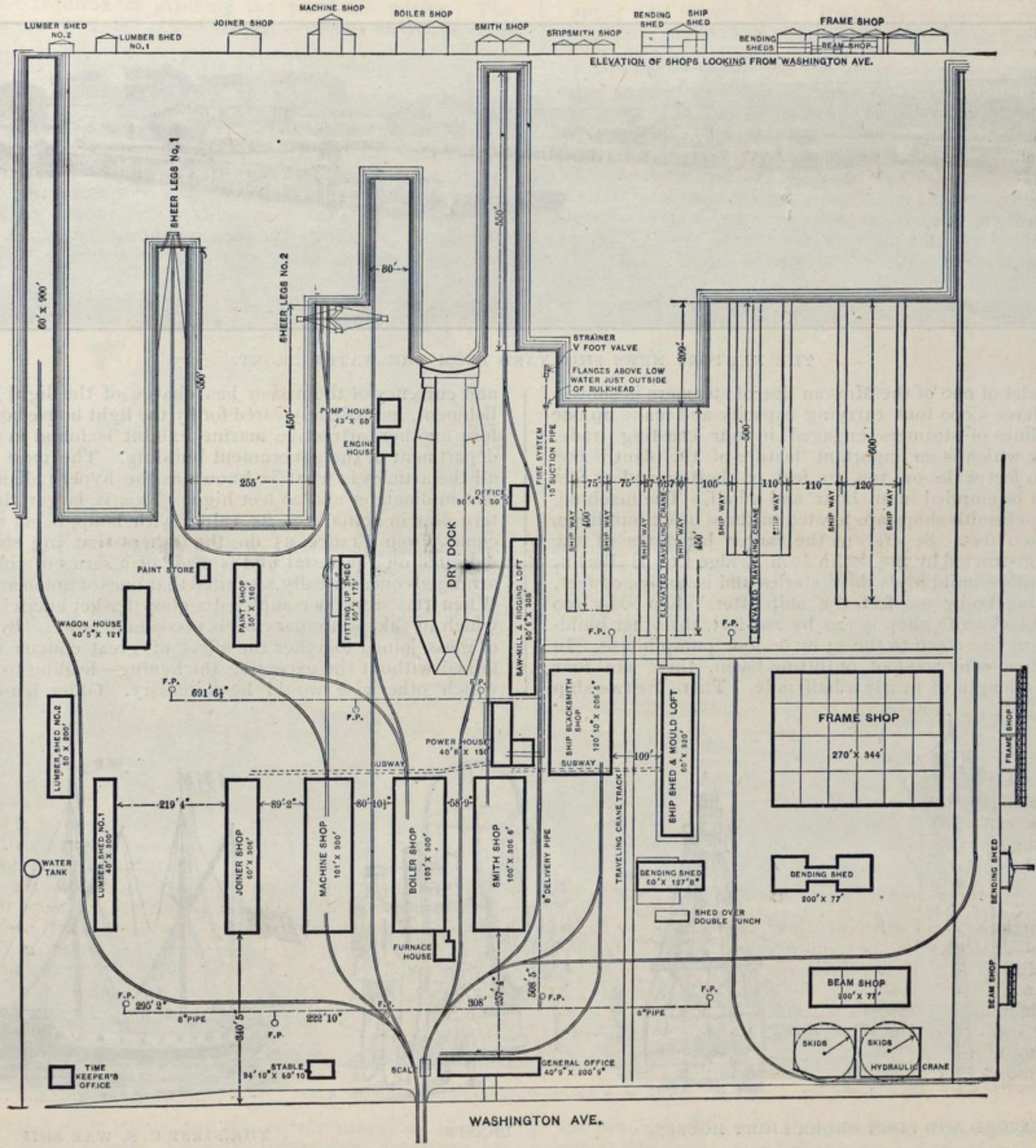

ENGINE OF
U.S.S.POWHATAN. A.D.1849.
ENGINE OF
U.S.S.POWHATAN.
DESIGNED BY THE BUREAU OF STEAM ENGINEERING 1848
CHARLES H. HASWELL, ENGINEER IN CHIEF.
BUILT BY A. MAHAFFY & CO. NORFOLK, VA.
HORSE POWER 1172. STEAM PRESSURE 15 lbs.
TOTAL WEIGHT OF MACHINERY 508 TONS.
ENGINE OF
U.S.TORPEDO BOAT NO.2.
DESIGNED BY THE BUREAU OF STEAM ENGINEERING 1891
BUILT BY IOWA IRON WORKS, DUBUQUE, IOWA.
HORSE POWER 1800 STEAM PRESSURE 250 lbs.
ENGINE OF
U.S.TORPEDO BOAT NO.2. A.D.1891.
1849. ILLUSTRATION SHOWING THE ADVANCEMENT IN MARINE ENGINEERING. 1891.
THE DRAWINGS SHOW THE RELATIVE SIZES OF THE ENGINES. BOTH BEING OF THE SAME SCALE.

COMPARATIVE ADVANCEMENT IN MARINE ENGINEERING.

NAVY DEPARTMENT EXHIBITS.

The functions of the different divisions of the navy department are well illustrated in the exhibits found below deck in the Illinois, as she has been named. The bureau of yards and docks exhibits plans of navy yards, and the scope of its authority includes the planning and maintainance of docks, slips and wharves, and the sole management of the different yards. Models, drawings and photographs are shown by the bureau of steam engineering, Commodore Geo. W. Melville, chief. The most interesting drawing is shown by an illustration herewith. It represents the advancement in marine engineering in the navy in forty-two years, during which time the weight of machinery per horse power has decreased from 972 pounds to 56 pounds, and the increase of the steam pressure from 15 to 250 pounds. The Powhatan's power consisted of two inclined engines, with cylinders 70 inches diameter and 10 feet stroke, developing 1,172 horse power and turning two side wheels. Steam was furnished at 15 pounds pressure by four copper boilers. The total weight of the machinery was 508 tons, the weight per horse power being 972 pounds. A. Mahaffy & Co., Norfolk, Va., built the machinery, and the hull was built at the Gosport navy yard, Norfolk. The length of keel was 246 feet; between perpendiculars, 250 feet; extreme length from billet to taffrail, 276½ feet; on deck, 251½ feet; breadth of beam, 45 feet; over guards, 69½ feet. She was launched Feb. 14, 1850. The two engines in the United States schools for the technical education of enlisted men, the enlistment and discharge of all enlisted persons, including appointed petty officers for general and special service, controls all rendezvous and receiving ships, and provides transportation for all enlisted persons and appointed petty officers, establishes the complement of the crews of all vessels in commission, keeps the record of service of all squadrons, ships and officers and prepares the annual naval register for publication, has under its direction the hydrographic office, the enforcement of the laws and authorized regulations, tactics, signal codes, and manuals of the service, and the uniform regulations, the collection of foreign surveys, publication of charts, sailing directions and nautical works, and the dissemination of nautical and hydrographical information to the navy and mercantile marine. A great deal of knowledge may be obtained by even a brief call at the hydrographic office display. There is a set of photographs illustrating a survey party, with their full equipment, and showing methods of work. There is also a complete set of record books, plotting sheets, and the first drawing of the chart. From this drawing a tracing is made with a steel point upon gelatine. The lines thus cut are filled with lamp black, and the gelatine is forced into close contact with a copper plate, the surface of which has been covered with a film of beeswax. By this means the outline of the chart is transferred to the copper. Some specimens of a complete copper engraved plate are shown and there are also illustrations of the method adopted for electrotyping the plates for reproduction. Besides various completed charts, there are exhibits of some relief models, among others one of the Atlantic ocean and another of the West Indies and Caribbean sea. The horizontal scale of this map is one inch to 33 miles, and the vertical scale is 33

times as great. It shows the characteristic features of the bottom of the ocean, and the surfaces of the surrounding shores and islands. The highest land shown is the peak in the Sierra Nevada de Santa Marta in Columbia, 16,419 feet high, and the greatest depth is in the depression north of Puerto Rico, where the bottom sinks to 4,561 fathoms, or about 5 miles deep. Among the instruments exhibited are a deep-sea sounding device that has been used for depths up to 4,600 fathoms and a transit with a solar attachment for finding the true meridian and declination of the magnetic needle. A complete set of the charts issued from the office is exhibited. They are 3,500 in number, and are divided into groups according to the United States naval station for which they are intended. Each of these station groups is



PLAN OF THE NEWPORT NEWS (VA.) SHIP BUILDING AND DRY DOCK CO'S. YARD SHOWN IN MODEL.

divided into portfolios containing one hundred charts, numbered consecutively.

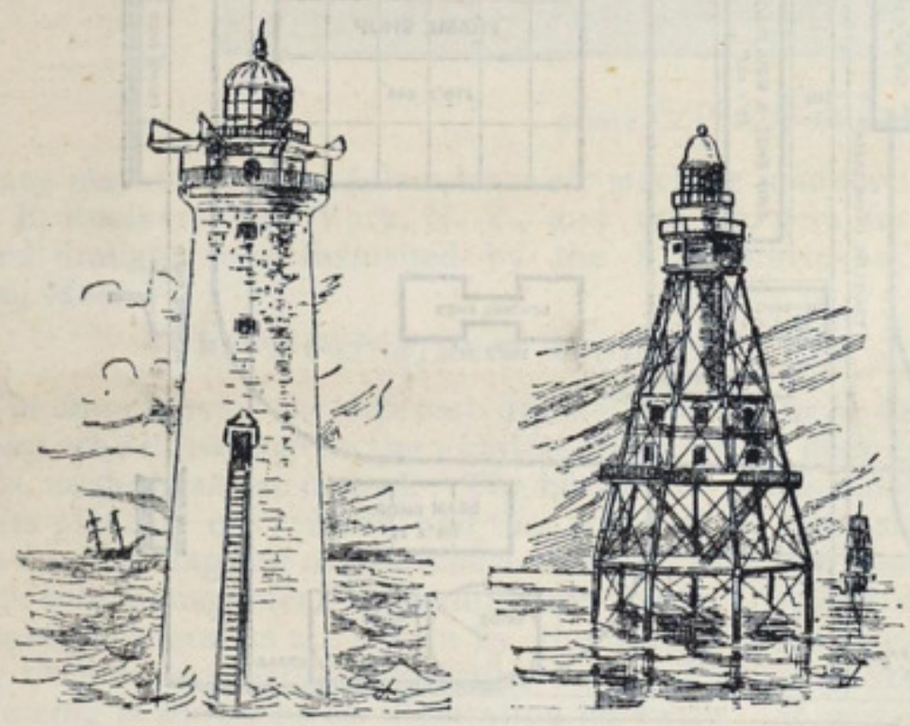
The following officers are in charge of the exhibits on the Illinois: Commodore R. W. Meade, navy exhibits; Lieutenant Commander E. D. Taussig, assistant; Lieutenant A. G. Winterhalter, bureau of equipment; Ensign C. P. Blow, navigation; Director F. C. Cosby, supplies and accounts; Surgeon A. C. H. Russell, medicine and surgery; Assistant Engineer Bennett, steam engineering; Gunner J. J. Walsh, ordnance; Mr. F. W. Grogan, principal technical assistant and architect of the naval exhibit. As a means of showing the progress of naval vessels in the United States an illustration of the first steam war-ship constructed in this country, or in the world, is shown for purposes of comparison with the steam war-ship described and illustrated in this issue. She was built in New York in 1814 from designs by Robert Fulton, and was named Fulton the First. Fulton's first design for this vessel, which he named the Demologos, was intended for a double-ended ship with two keels, flat bottom, a gun deck, and a main deck. Her sides were to be 5 feet in thickness, diminishing below the water line, and she was to be propelled by a paddle-wheel, contained in a well placed in the ship's center. The shaft was to be turned by a single-cylinder engine, and the weight of the engine on the one side was to be counterbalanced by the weight of the boiler on the other. Her length was to be 140 feet by 42 feet and she was to carry 20 guns. As ultimately built, however, she was 156 feet long, 20 feet deep, and 56 feet broad. Instead of a small well for the paddle-wheel, a long channel, 15 feet wide and 66 feet long, was provided for it. On one side of the hull was a copper boiler, 22 feet long, 8 feet deep, and 12 feet wide. On the other side was the engine with one cylinder, 48 inches in diameter and 5 feet stroke. The paddle-wheel was 16 feet in diameter and 14 feet wide, giving a clearance of 6 inches from the sides of the channel. It dipped 4 feet. Her tonnage was computed at 2,475 tons—a very large vessel for that period. Her hull was designed by Samuel Humphreys, of New York, and cost $144,949. The engine cost $40,199 and the boiler $93,396.

NEWPORT NEWS SHIP BUILDING PLANT.

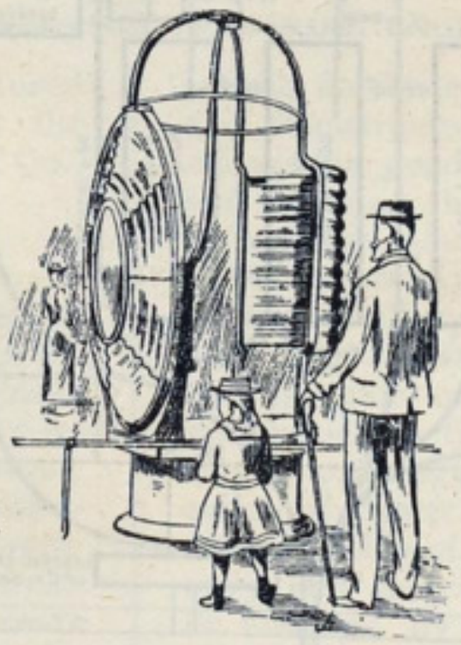
Section E in the gallery column 30, transportation building, is the location of the topographical model of the plant of the Newport News Ship Building and Dry Dock Company, Newport News, Va., comprising some 100 acres, and believed to be the best equipped ship building plant on the eastern coast. The buildings cover six acres. A detailed plan of the yard is shown by an accompanying drawing and the half mile of water front is represented by an illustration from a photograph. No expense was spared in furnishing everything necessary to the economical construction of steel ships when the plant was built, while other yards have added these things at intervals. Naval work is all that is wanted to give the yard the importance it really merits.

THE NEWPORT NEWS SHIP YARD FROM THE WATER FRONT.

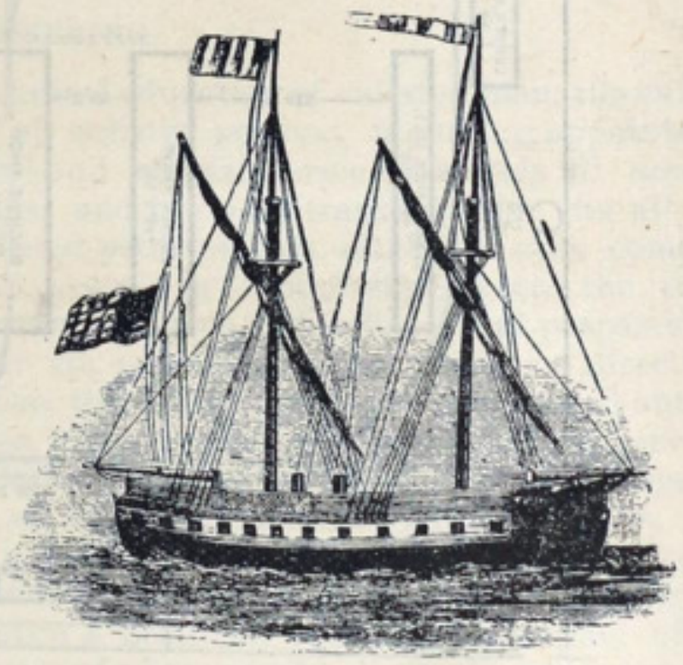
A 20-foot model of one of the Morgan line of steamers is shown. These ships have 5,000 tons carrying capacity and make up one of the finest lines of steamers engaged in our coasting trade. The dry dock which is an important feature of the plant is 600 feet long, 130 feet wide on top, 50 feet on bottom and 25 feet deep. It can be emptied in an hour and a half. The machine, boiler and blacksmith shops are located in three brick buildings, each 100 by 300 feet. Several of the larger buildings of the plant were constructed by the Berlin Iron Bridge Co., E. Berlin, Conn. The office building is three stories and is 40 by 200 feet, the pattern shop 60 by 300 feet, the ship fitters' shop 60 by 320 feet and the blacksmith shop is 120 by 208 feet, the other buildings ranging in size down to the 43 by 60-foot pump house. In addition to the 900 by 500-foot outfitting basin, there are four piers having a length of nearly a half mile. There are two ship ways 400 feet long, two 450 feet and four 500 feet long. An average of about 100 vessels are docked each year.



SECOND AND FIRST ORDER LIGHT HOUSES.



LENSES.



THE FIRST U. S. WAR SHIP.

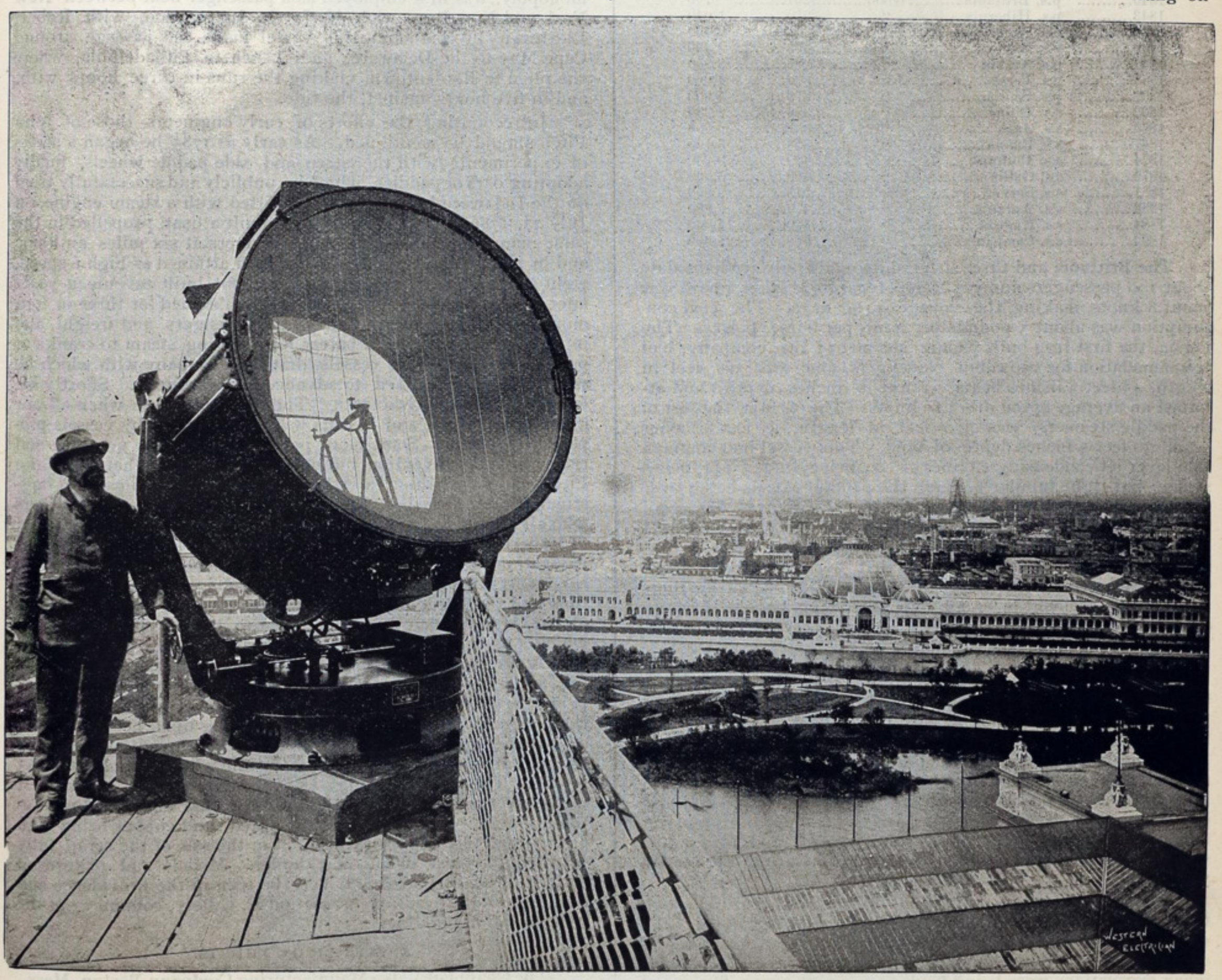
THE LIGHT-HOUSE EXHIBIT.

Captains and mates who refer to their charts so often will no doubt be interested in the exhibit to be found in the government building where they are printed. It is in charge of Chas. J. Hatchlow of the U. S. coast survey. The copper plate is inked with a roller. The printer then rubs off all the surplus ink, leaving the lines filled, and then the impression is taken by pushing the plate under a felt covered roller. Every particle of ink must be removed from the surface or imaginary islands and shoals will appear where there is clear water. About 800 Sault river charts could be printed in a day of eight hours, while the largest size come off much more slowly. In connection with this a model of the United States survey steamer Blake is shown, with her deep-sea apparatus. The Blake was launched in 1874, and since that time has been chiefly employed in deep-sea soundings. Since 1885 she has chiefly been engaged in investigating the currents of the gulf steam. For the estimation of time, latitude, and longitude there is a splendid collection of instruments, including transits, chronometers, and zenith and meridian telescopes. In the department of magnetics there are instruments for estimating the variation of the mariner's compass and other apparatus of a technical sort, and globes and charts.

The same government department that cares for the coin and currency of the nation has charge of the light house establishment, immediately cared for by the light house board. Therefore another attractive marine exhibit is found in the treasury department of the government building. The most striking of all the articles is what is known as the hyper-radiant lantern, 9 feet in diameter and 20 feet high. This is larger than any lantern now in actual use, its value, with lamp, being $17,000. It comes from France as do the others that are shown. It is mounted on a pedestal and is made of a series of rings of glass, arranged concentrically, so united that lines of union are concealed. When the work is completed a glass basket encircles the lamp, which in this particular case is 600-candle power. By using rings of glass joined together the effect of great convex lenses is obtained without the excessive thickening—leading to obscurity—which otherwise would be necessary. Other lenses of lesser magnitude and various patterns are shown. Two model lighthouses are exhibited, one of masonry, the other being arranged on pillars. An electric buoy is shown with lantern and lamp attached. An interesting exhibit is that of the whistling buoy. The action of the air by varying the degree of compression of a column of air contained in the buoy, causes a whistle to sound. One of the most interesting of the various articles is the model of a light-ship, with specimens of the lamps and lanterns. The light-ship service is arduous, the constant tossing of the little vessels in wild waters and the loneliness and exposure producing hardships of greater moment than those to which the lightkeepers of the coast are subjected. The men find recreation in literature, books being provided by the government.

THE 194,000,000-CANDLE POWER SEARCH LIGHT.

The General Electric Company claims to have made the largest projector or search light in the world, the Schuyler Electric Company, Middletown, Conn., makes the same claim, and both claim 375,000,000 candle power, while the projector manufactured by Schuckert & Co., Nuremberg, Germany, and located on top of the manufactures building has a mirror and lense of the some size as the others, 5 feet diameter, and yet claims for only 194,000,000 candle power are made for it. In point of modest claims it is certainly the greatest search-light in the world. It is claimed that the light from it may be seen at Milwaukee, 85 miles away. Its location gives it an elevation of 230 feet, and mounted it stands 8½ feet above the platform. Six months were required for grinding the parobolic mirror. The arc itself is 47,000 candle power strong, or equal to about 3,000 ordinary incandescent lamps, and the mirror magnifies this to 194,000,000 candle power. From the illustration, furnished by the Western Electrician of Chicago, an idea of its size may be had. The illustration also shows a good birds-eye view of the central portion of the grounds, the horticultural building appearing most plainly, while away in the distance is the Ferris wheel, the inventor of which claims he will make Chicago a seaport in a few years. To the left at the bottom of the frame may be seen a glimpse of the transportation building. There are a number of search lights on lake steamers, the Virginia, Christopher Columbus and the Saml. Mitchell being fitted. The one on the Saml. Mitchell is fixed at the stern and is used when she is coming down the river at Cleveland from her dock, stern first. The new Northern passenger steamers will also be fitted with them. While their use in the merchant service is limited their possibilities in naval warfare are great. When the light from the Schuckert projector is thrown on MacMonnies' fountain a dazzling seene is produced that brings forth many exclamations, but one night recently the light was directed against a large American flag that was waving in the breeze. It seemed to transfer the bars into streams of red and white light and the stars into their real counterparts, making an effect that baffles description, but those fortunate enough to see it will never forget it.



THE 194,000,000-CANDLE POWER SEARCH LIGHT.

WHITE STAR AND CUNARD LINE EXHIBITS.

Next to the International the White Star exhibit is the most attractive of any of the Atlantic passenger lines. It consists of a circular building having a rail and netting around the upper and lower deck. Cork life preserver rings, on which are the names of the different boats of their fleet are hung on the netting. The half of the building that represents the ship's side is fitted with dead lights instead of windows. Smoking and dining rooms similar to those on the Teutonic and Majestic, only much smaller, are represented. Two staterooms are shown and the curious can see just what accommodations the rich man has when he crosses to Europe. A red and a green light mark the entrance so that any seafaring man can steer for it with certainty. The main interior is occupied with models, among them being the Oceanic built in 1870, the Teutonic and the Bovic. Those who have lost interest in marine since engines and propellers have distanced canvas will examine the model of the sailing ship California. She is 318 feet long, 45 feet beam and 26½ feet deep. She is still in service. Her rigging consists of double top-sails, top-gallant and royals on the fore, main and mizzen, the jigger having the ordinary canvas. Those having

friends en voyage on this line can ascertain their location each day by examining the chart on which are movable models. No information is given of the Gigantic, building for this line, and which, it is said, will be 700 feet long, 8 feet longer than the Great Eastern.

The Cunard line exhibit, to be found on the main aisle of the transportation building, consists of models, that of the Campania being the most interesting of course. A large number of photographs in racks show interiors of the great liner, and information concerning her movements is posted frequently. The advances made in construction and marine engineering by this company is portrayed in the following data displayed at the exhibit:

Date of build.	Name and type of vessel.	Material.	Length p. p. ft.	I. H. P.
1840	p.s. Brittania	Wood	207	740
1843	p.s. Hibernia	"	210	1,040
1848	p.s. America	"	251	2,000
1850	p.s. Asia	"	266	2,400
1852	p.s. Arabia	"	285	3,250
1855	p.s. Persia	Iron	376	4,000
1862	p.s. Scotia	"	379	4,900
1862	s.s. China	"	326	2,250
1865	s.s. Java	"	337	2,650
1867	s.s. Russia	"	358	3,100
1874	s.s. Bothnia	"	420	3,250
1879	s.s. Gallia	"	450	5,300
1881	s.s. Servia	steel	515	9,900
1882	s.s. Aurania	"	470	9,900
1884	s s. Umbria	"	500	14,500
1893	t.s.s. Campania	"	600	26,000

The Brittania and three sister-ships could only accommodate about 100 passengers and 225 tons of cargo. Their speed was about 8 knots, making the voyage 14½ days. The coal consumption was about 5 pounds per hour per horse power. The Persia, the first iron-built paddle steamer of the company, had accommodation for 250 cabin passengers, and was 367 feet in length, 45 feet 3 inches beam, 31 feet 6 inches depth, and attained an average speed of 13.8 knots. The Scotia, the last of the paddle steamers, was 370 feet in length, 47 feet 8 inches beam, 30 feet 5 inches depth of hold. This vessel had common side lever jet-condensing engines of 100 inch cylinder, 144 inches stroke, and eight tubular boilers, the paddle wheels being over 40 feet in diameter, and her cost, ready for sea, was $850,000. The Scotia made the passage from New York to Liverpool, in 8 days and 22 hours. A model of the screw steamer Russia is to be seen, in which vessel it is said that her commander, Capt. Cook, navigated 630,000 miles in the Atlantic in all weathers without any accident or break down, carrying in safety 26,076 cabin passengers.

MISCELLANEOUS NOTES.

The exhibit of the Vulcan company of Stettin, Germany, in the gallery of the transportation building, is liable to be overlooked, but it is worth looking for. The model of the Ting-Yen, built by this company for the Chinese government, having 6,300 horse power, is very pretty. The cruiser Irene, 308 feet long, 46 feet beam having a speed of 18 knots with 8,000 horse power; the Hohenzollern, 388 feet long, 46 feet deep, having 9,000 horse power having a speed of 20 knots; and the Brandenburg 354 feet long, 62 feet beam, having 8,000 horse power and 15½ knots speed, are good examples of the work put forth from the Stettin yard.

The Viking ship was pretty well exhibited on her trip through the lakes to Chicago, but the following may not be known: She was constructed at Sandyford, Norway, and is an exact reproduction of the Viking ship which was discovered accidentally when excavations were being made some years ago. The vessel is 60 feet length of keel, 71 feet 4 inches over all, 16 feet beam, 3 feet 8 inches depth amidships, but 9 feet at the extreme ends, and is fitted with one mast amidships having a square sail, 20 feet in the head and 28 feet in the foot, besides which there is a large jib. The vessel is also provided with thirty-two oars 18 feet long. The construction is peculiar, especially as to the mode of securing the planking, which consists of oak ¾ inch thick, having cleats projecting on the inner side formed out of the solid wood, so arranged that each cleat corresponds to the position of a frame. Holes are cut in each frame in way of each plank, and through these holes the entire planking below the water-line is connected to the frames by cord lashing. Above the water-line the planks are secured by iron clenched bolts.

A note of interest in connection with the exhibit of the Hoboken Ferry Company, presenting the original engine and boiler of the Col. John Stevens, named for the inventor and operated by him in New York harbor in 1804 at a speed of from 4 to 8 miles an hour, was the presence of Col. E. A. Stevens, president of the ferry company, at the engineering congress, held in Chicago recently, and in which he was a prominent figure. In 1844 the engine was fitted in a hull during the American Institute fair, and run at a speed of eight miles an hour. It would appear, therefore, that three years before Fulton's Clermont made her trial trip, Col. Stevens had demonstrated the efficiency of the screw propeller. It is also interesting to note that in association with his son, Robert L. Stevens, in 1807, he constructed the paddle-wheel steamer Phœnix, which sailed up the Hudson, a few days after Fulton made his successful voyage with the Clermont. The Phœnix was 50 feet long, 12 feet beam, and 7 feet deep, and, precluded from being employed on the Hudson owing to Fulton's and Livingstone's monopoly, was first employed as a passenger boat between New York and New Brunswick, N. J. In June, 1809, with Robert L. Stevens in command, this vessel made the passage around Cape May to the Delaware, and thence to Philadelphia, where she plied to Bordentown, making the runs in three hours with, and in five hours against, the tide.

In recounting the efforts of early engineers those of John Fitch should be mentioned. As early as 1785 he began a series of experiments with the stern and side paddle wheels, finally adopting oars or paddles, which he publicly and successfully tried on the Delaware by driving a skiff fitted with a steam engine, on July 27, 1786. Two years later he built a boat, propelled in the same manner, which carried 30 passengers at six miles an hour, and in 1790 he built another boat which attained as high a speed, eight miles an hour, as Fulton's Clermont built seventeen years later. This last mentioned boat of Fitch's plied for three or four months on the Delaware, carrying passengers and freight, and in 1791 he was granted a patent for applying steam to cranks or paddles for propelling vessels, but the company with which he was connected declined to advance further funds. Shortly before his death he predicted: "The time will come when all our great lakes, rivers, and oceans will be navigated by vessels propelled by steam. Some more powerful man will get fame and riches from my invention, but nobody will believe that poor John Fitch can do anything worthy of attention." Rumsey, Longstreet, Morey, Ormsbee, Roosevelt, and Evans are other pioneers who all appear to have carried out experiments in America, but to Robert Fulton remains the credit of first applying steam for navigation purposes with commercial success. The Clermont commenced work in 1808, and in the same year the Car of Neptune and the Paragon were built. In 1816 the number of boats on the Hudson had been increased to eight. The Fulton, of which a model is exhibited, built early in 1814, plied between New York and Albany during the summer of that year, and in the following spring made her first trip on Long Island sound, being the first steam vessel to navigate these waters. She was sloop-rigged, having one mast, depending upon her sails to accelerate her speed. Her length was 134 feet, breadth 26 feet, and 30 feet outside the guards. The paddle wheel was about 6 feet stroke. The original boiler was made of copper, and at first wood was used as fuel, but years afterwards, when coal was introduced, an iron boiler was substituted, and copper being high at the time, the amount realized from the sale of the scrap fully equalled the cost of the new boiler. Models and pictures of some of these early steamers may be seen in the Providence and Stonington line exhibit in section E, gallery, column 27 of the transportation building.

ADVERTISING EXHIBITS.

The Chapman Valve Manufacturing Company, Boston, Mass., show their straightway valves and other specialties in section 26, column K 28, machinery hall.

Section 25, column O 24, machinery hall, marks the display of the Lunkenheimer Company, Cincinnati, O. Their steam, gas, water and oil specialties are shown.

The Sherwood Manufacturing Company, Buffalo, N. Y., exhibits injectors, glass oil cups, compression grease cups and steam specialties in machinery hall, column K 24.

A steam launch, a gas engine launch 16 feet long and a pumpkin seed sail boat 18 by 9 feet and a couple dozen row boats comprise the exhibit of the Truscott Boat Manufacturing Company, St. Joseph, Mich., located in section D, column 13, transportation building.

The exhibit of injectors that attracts attention is located in machinery hall, section 25, column M 24.. It belongs to the

Penberthy Injector Company, Detroit, Mich., and consists of their oilers, spring cover cups and ejectors. All these articles are shown in working order in the exhibit and eight of the injectors are used to feed the battery of Heine boilers in the power house. Manager Johnson and representative Lee are in charge.

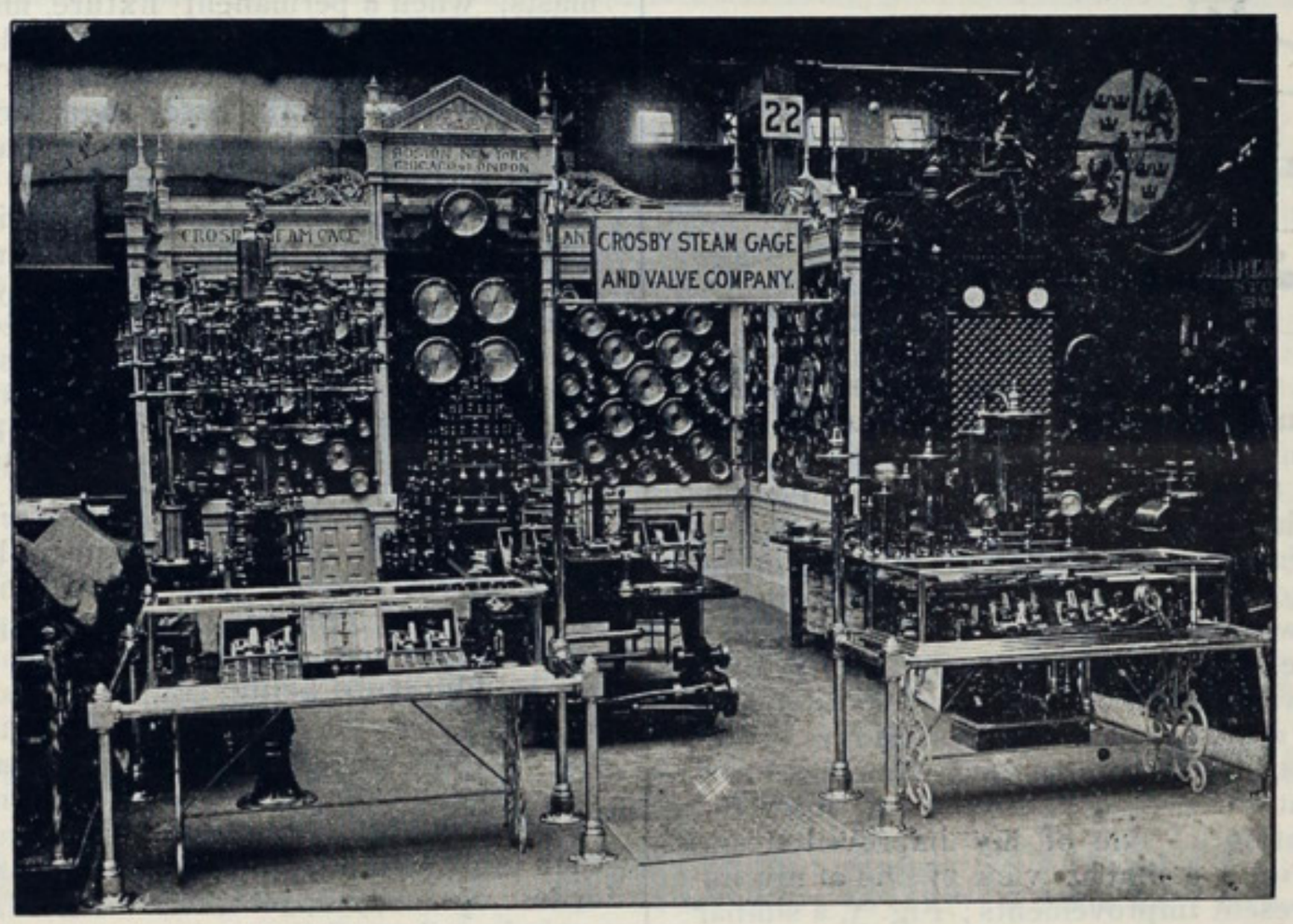
One of the important exhibits in the transportation building has been overlooked by the REVIEW. It is located in section V, column 13, and is made up of corrugated furnaces, welded steel steam pipes and other specialties manufactured by the Continental Iron Works, Brooklyn, N. Y. As these furnaces are used in the boilers of a large number of lake steamers and also in naval vessels, the exhibit is worthy of attention from marine men.

H. R. Worthington, New York, in addition to the four pumps in the pumping station, supplying 40,000,000 gallons of water per day, have seven pumps in section A, machinery hall, with a capacity of 20,000,000 gallons, besides their display of condensers. Worthington pumps are also to be found in connection with pretty nearly every exhibit that needs special water service. They reach from the Libbey glass factory on the Midway plaisance to the U. S. war ship in the lake, and from the United States Wind Engine and Pump Company exhibit to the last lagoon that the steam launches traverse.

In section 25, K 22, machinery hall, the Crosby Steam Gage and Valve Company, Boston, Mass., shows about thirty kinds of indicators for all services, some of which are designed to indicate cylinder pressures as high as 900 pounds. One pair of the indicators exhibited was given a gold medal at the Paris exposition. The whistles shown range in size from 2 to 12 in. and are the single bell chime patented by Crosby. A boiler testing apparatus suitable for boiler shops can be seen in the illustration. Water columns, steam gages and dials, revolution counters, lubricators and safety valves form an importaht part of the display made by this well known concern.

It is worth while to note the name and make of injectors used in the power house. Eight Penberthys are used on the Heine boilers; six Schaffer & Budenburg's Peerless on the Stirling, the boilers that all the other makers fought against admitting; six Nathan on the Campbell & Zell boilers; six from N. A. Watson, Erie, Pa., on the Abendroth & Root boilers and five Hancock on the Babcock-Wilcox boilers. In addition to these there are three Sellers and five Metropolitans in use. The following makes of boiler feed pumps are used: Buffalo, Gould, Marsh, Blakeslee, Smedley, Hall and McGowan.

EXHIBIT OF DE GRAUW, AYMAR & CO., NEW YORK, N. Y.



CROSBY STEAM GAGE AND VALVE COMPANY'S EXHIBIT.

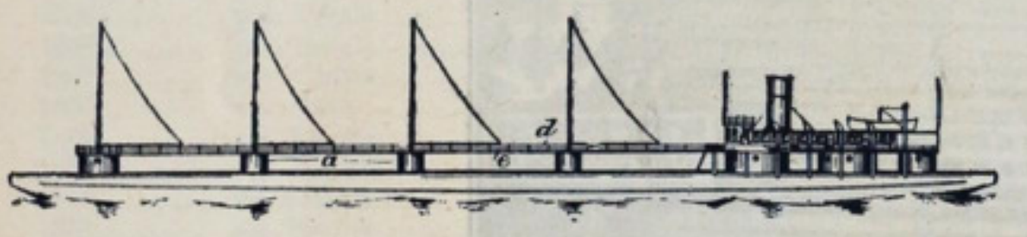
The American Ship Windlass Company of Providence, R. I., has just received an order for four No. C Providence crank capstans for a new bark, No. 132, building by R. J. Evans & Co., at Liverpool. English builders in the vicinity of Liverpool are now calling in many cases for the Providence capstans on their new ships.

Germany is said to be preparing to spend $10,000,000 on new war ships.

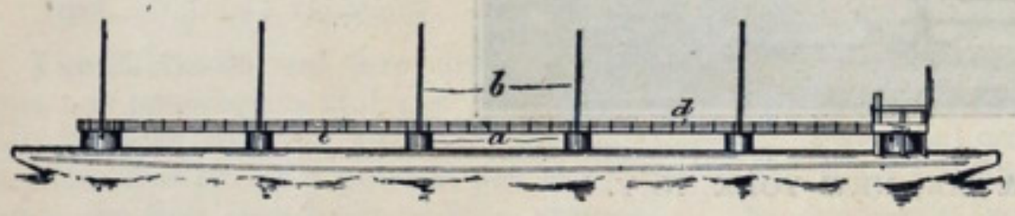
Capt. Alex. McDougall's Patents.*

IMPROVEMENT OF DECKS OF WHALEBACK VESSELS—SPECIFICATION FORMING PART OF LETTERS PATENT NO. 498,681—DATED MAY 30, 1893—APPLICATION FILED JULY 29, 1892—SERIAL NO. 441,616—NO MODEL.

The inventor says: "My present invention relates particularly to various new and useful improvements in those vessels heretofore invented by me, and described and claimed in several letters patent of the United States. The vessels as described in the said letters patent, are of two general classes, known particularly as barges and steamboats, and which differ from one another only in the fact, that the latter class of vessels are provided with mechanism for propelling them, and also with a cabin. The hulls consist generally of steel plates secured to transverse ribs, and the sides thereof are parallel, both longitudinally and vertically. The top is curved, the bottom is slightly rounded, the bow is spoon-shaped and the stern is skeged in the usual way to facilitate steering. It has been found that by reason of the high load line of the boat it is difficult to pass with safety over the curved top, from one end to the other, in heavy weather, since waves are liable to flow entirely over the vessel. By means of the present improvement this objection is overcome. The improvements also increase the efficiency of the vessel in numerous other ways. Before beginning a description of my present invention, it is to be understood, that I am not to be limited in any way to the use thereof with the particular vessels to which I have before made reference, since the improvements may be used in connection with other varieties of boats, provided either with curved or flat decks. For a better comprehension of my invention attention is directed to the accompanying drawings forming a part of this specification:



-Fig-1-



-Fig-2-

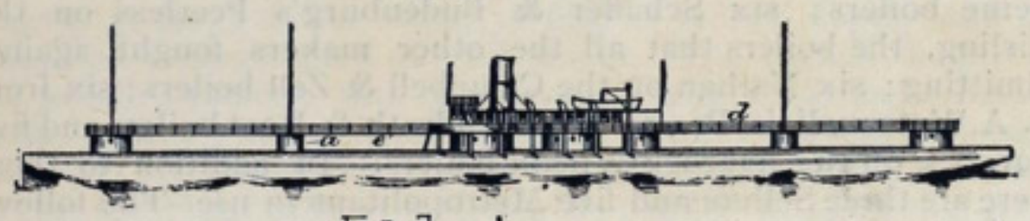
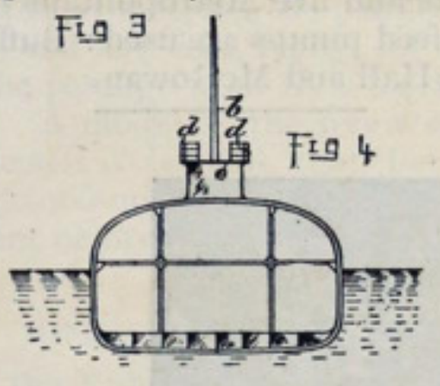


Fig 3



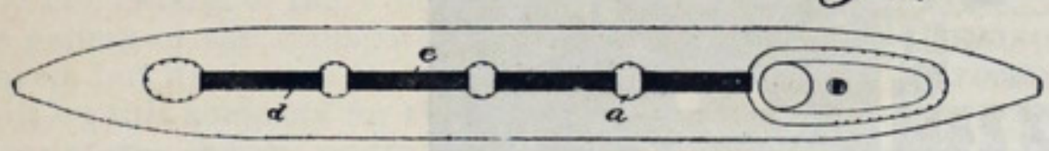


Fig. 5.

"Fig. 1 is a side elevation of one of my improved steamboats attached thereto; Fig. 2, a similar view of one of my improved barges with the present improvements; Fig. 3, a similar view of a modified form of steamboat, showing the present improvements; Fig. 4, a sectional view of Fig. 2, and Fig. 5, a top view of Fig. 1. In all of the above views corresponding parts are designated by the same letters of reference. The general features of the steamboat shown in Fig. 1, and of the barge illustrated in Fig. 2, are the same in all respects as that which I have described and claimed in said letters patent before referred to. The steamboat shown in Fig. 3, however, differs from any vessel which has been made the subject of letters patent, in that the propelling mechanism and cabins are located at or near the central portion of the boat. In this boat also, a wedge shaped or cut away bow may be used instead of the spoon shaped bow. In other respects this particular boat is identical in all its features to that shown in Fig. 1. The three vessels shown in Figs. 1, 2 and 3 are also provided with stern turrets, for entering the interior of the after part of the hull, as I have before descsibed in said letters patent. The two steamboats shown in Figs. 1 and 3 are also provided with cabins, supported on large turrets, which features have also been described in prior patents.

"The principal features of my present invention are the smaller turrets *a a a* which extend up from the top of the vessel, and are of the same height as the larger turrets. These small turrets are arranged at suitable distances apart, and these small turrets are of the same construction, and are secured to the top of the vessel in substantially the same way as the large turrets. The principal use to which I put these small turrets is to support a suitable passage way, to enable the crew to pass in safety from one end of the boat to the other, as I shall presently describe, but these small turrets also serve many other useful purposes, which further tend to increase the efficiency of the boat. These small turrets may be used primarily to support suitable masts *b b* as shown in the drawings. These masts pass down through a suitable hole formed in the top of the small turrets *a a* and engage with an ordinary step on the top of the vessel, or on an intermediate deck. On these masts sails can be mounted, which are to be of any appropriate construction. For simplicity, however, ordinary leg o'mutton sails are preferable. These sails, when not in use, may be rolled up and stowed away within said small turrets, for which purpose the said turrets are well adapted, being water tight and readily accessible. The sails, when stored, will be kept always in good condition and within easy reach. The masts before referred to may be a permanent attachment to the boat, for the reason that they will not interfere in any way with the loading and unloading and operation of the vessel, and in this event the said masts may be strengthened, if desired, by means of the usual shrouds and stays, but in view of the rigid support which the said small turrets give to the masts, the use of such shrouds and stays, becomes less necessary. By making use of numerous short masts and many small sails, additional security and advantage are obtained, since a small sail is less liable to be blown away than a large sail, and a small sail is handled with greater ease and facility than a large sail. The masts, when a permanent fixture, may be used in loading and unloading the boat by mounting a boom on each, carrying a block and tackle in the usual way. These booms may be swung from the dock over the hatchways, carrying the cargo, and thereby greatly facilitating the loading and unloading of the boat. These small turrets *a a a* also serve a very useful purpose when the vessel is used for the transportation of grain and other similar bulk cargoes, which settle materially under movements of the boat. The vessel is filled entirely with such cargo, and the small turrets are also filled, and connect with the hold of the vessel. When the grain or other cargo settles under movements of the boat, this material will flow more or less out of the small turrets, so that the hold will be always kept entirely full. In this way, the possibility of the cargo shifting is done away with.

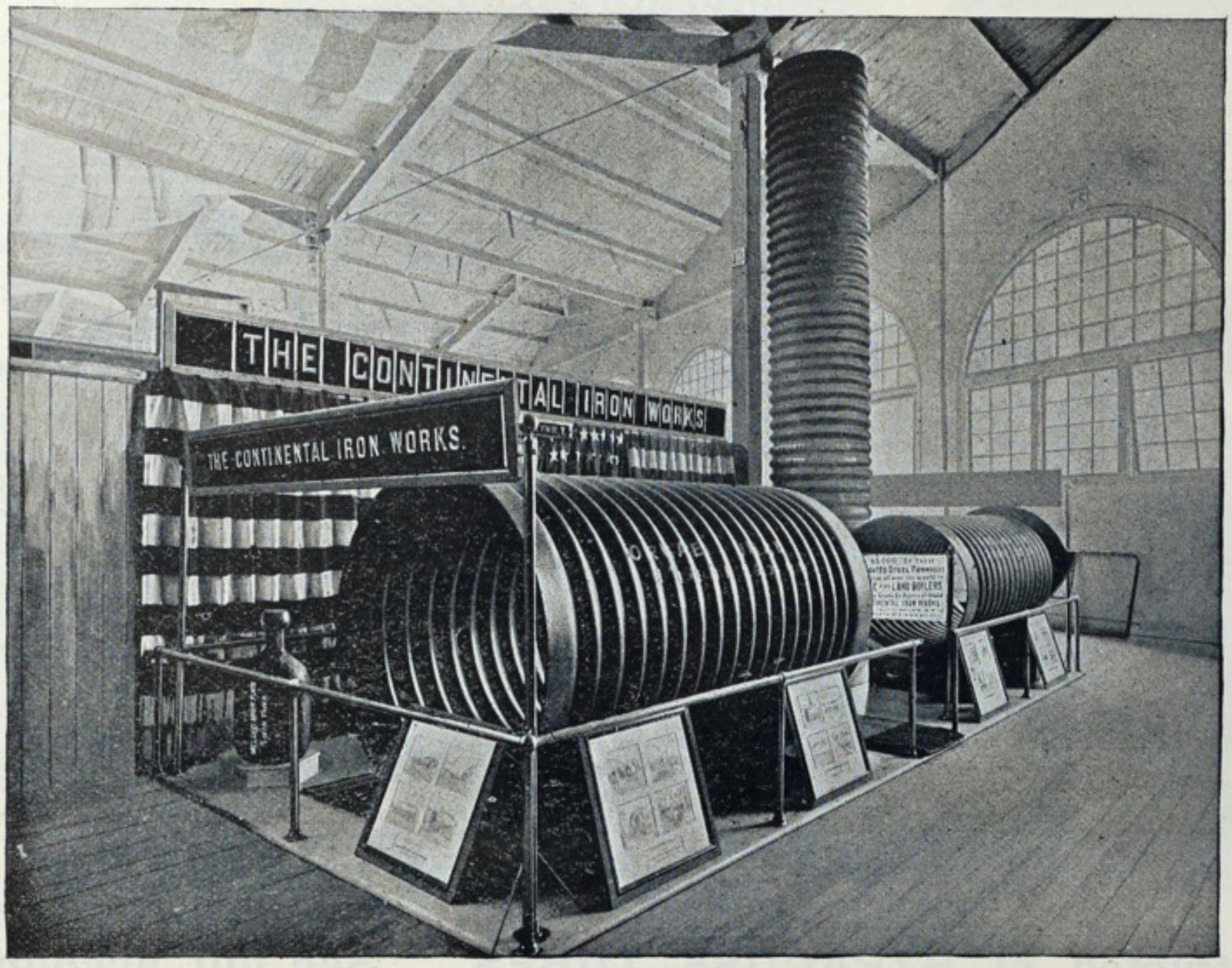
"In the case of a vessel for carrying oil, or any other liquid, which expands under the effect of heat, the small turrets also serve for effective use, since being connected with the interior of the boat, they will allow for any expansion of the oil. These small turrets may also be used for loading such a boat with oil, the loading tube being simply passed down through the same, as in ordinary oil boats. In oil boats, it is desirable to divide the boat into a number of compartments or tanks, each of which may comunicate with one of the small turrets *a a*. By thus dividing the boat into tanks, or compartments, and by providing each tank with one of the small turrets above the same, a greater or less quantity of oil can be carried, with one or more tanks, entirely full at all times, irrespective of the expansion of the oil. It will be understood that one turret may serve for two compartments. In addition to the above uses, the small turrets *a a* serve to support a passage way *e* on which the crew may pass in safety from one end of the boat to the other, entirely clear of the wash of the sea over the vessel. This passage way can be of a number of constructions, all of which are intended to be covered and embraced herein. The said passage way may be made of metal plates, secured to suitable supporting irons, so as to form a permanent fixture to the boat. Such a passage way will be very strong and durable, and in many connections will not interfere

*Under this heading we will publish specifications accompanying letters patent granted to Alexander McDougall, of West Superior, Wis., since his first application for a patent on the whaleback type of vessel, May 1, 1880.

with the loading and unloading of the boat. The said passage way, when made of steel plates secured to supporting irons, being rigidly mounted on the small turrets above the deck, serves as a chord or truss, whereby the hull of the vessel will be strengthened very materially in a longitudinal direction. In cases, where the use of a permanent passage way might prove objectionable, it may be made in sections (see Fig. 5) reaching from turret to turret, to which the sections are to be attached in any suitable manner. Such a passage way, made in sections as I have just described, will offer a safe passage for the crew, and one or more of its sections may be removed at any time so as to allow of free and uninterrupted access to any or all the hatches, for purposes of loading and unloading. Instead of either of the forms I have just described, a passage way made of rope netting, or some pliable substance, may be used. This rope netting is to be stretched taut in any suitable way, so as to offer a firm and unmovable construction. The principal advantage of this latter construction is that the rope netting just described, may be quickly removed, and rolled up so as to take up but little space when not in use, and if need be it may be stored within the said small turrets. With any one of the three forms of passage way before referred to, a railing *d d* on each side is to be used, for the sake of safety. This railing consists of wire rope, passing through stanchions in the usual way, or instead, any other suitable construction may be substituted.

Exhibit of the Continental Iron Works at the Fair.

A very interesting display is made by the Continental Iron Works of Brooklyn, N. Y., at the World's Columbian Exposition at Chicago. The exhibit, a view of which is shown herewith, is advantageously situated in the transportation building and commands considerable attention. Its official location is column 13, section V. The Continental Iron Works is largely engaged in the production of corrugated furnaces for use in internally fired boilers, both for marine and land purposes. Up to the present time, over 65,000 of these furnaces have been made in Europe and the United States, and the demand is continually increasing. In this country they are made only by the Continental Iron Works. The exhibit comprises furnaces with flanged ends for attachment to the back connection, also straightened furnaces for use where it is prefered to flange the back tube sheet of the boiler. Included in the exhibit is a sample of steel steam pipe, a duplicate of one of the pieces which the Continental Iron Works is furnishing the William Cramp & Sons Ship and Engine Building Company for use in the United States cruisers Columbia and Minneapolis. This pipe is made of steel plates rolled and welded into cylinders, and the flanges are formed of steel of much greater thickness than the body of the pipe, and welded to it. The pipe is then thoroughly annealed and the flanges faced off, the bolt holes drilled and the whole subjected to rigid test and inspection.



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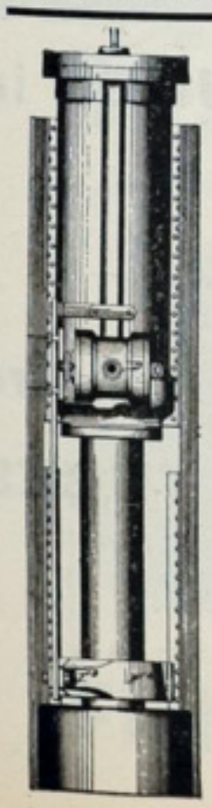

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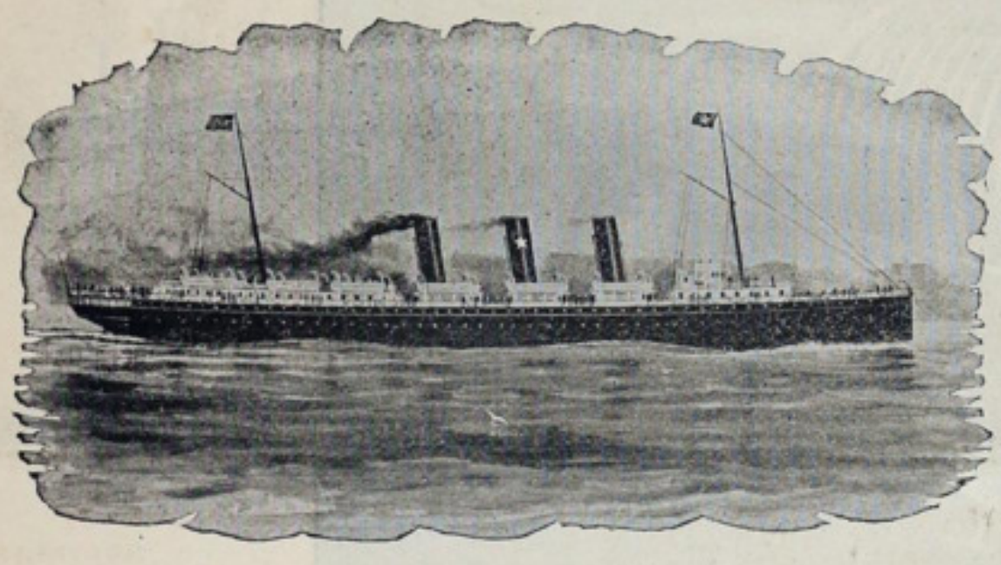

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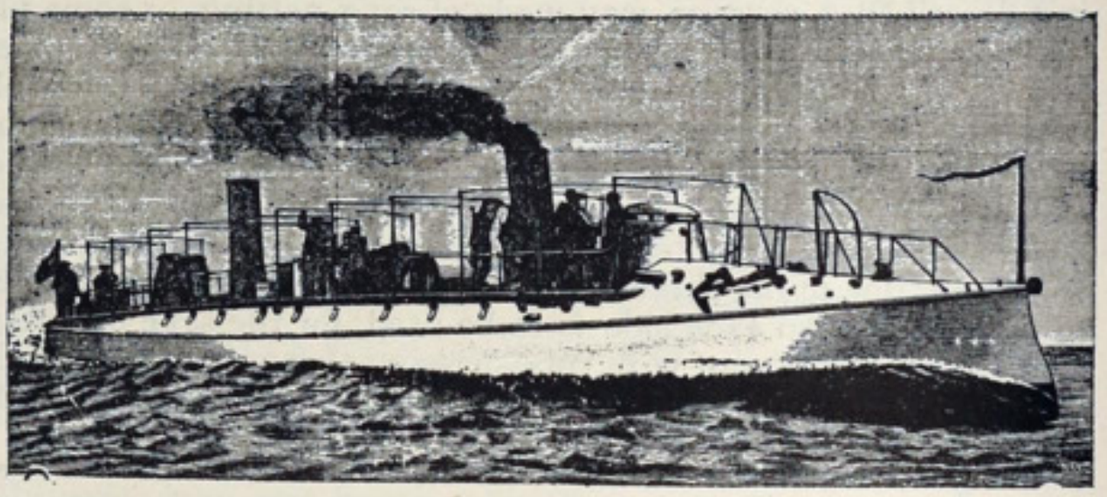

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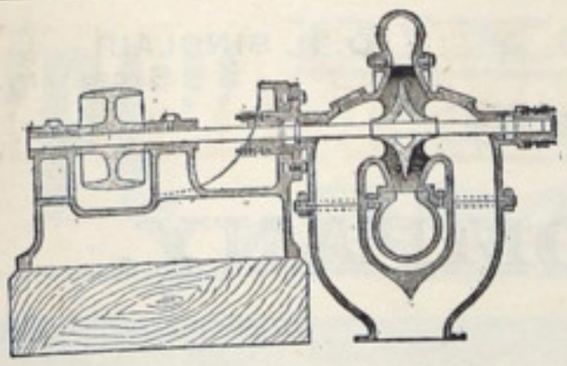

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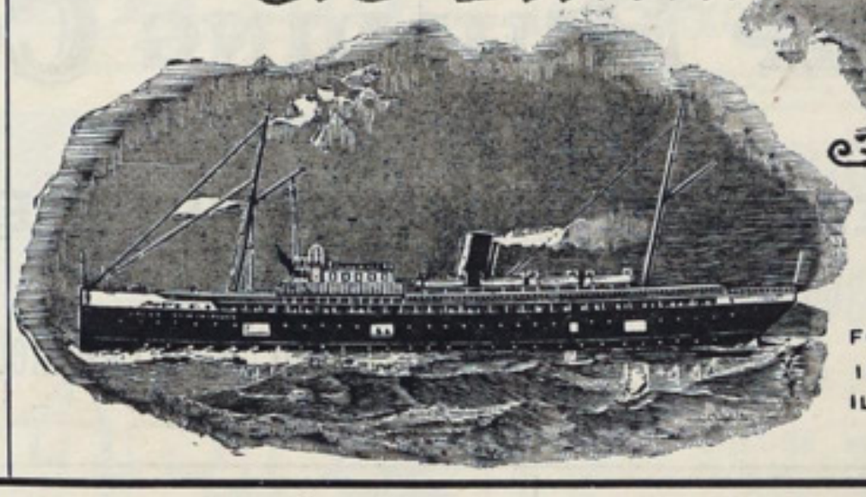

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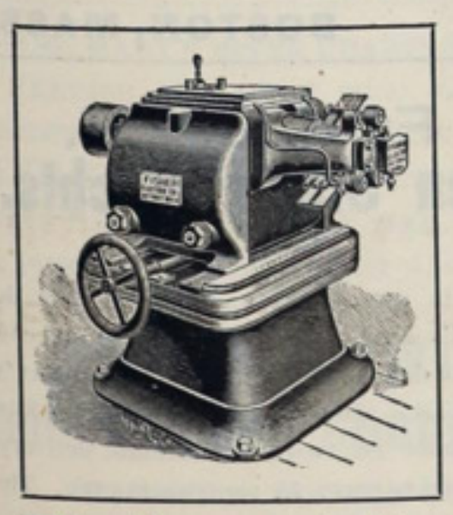

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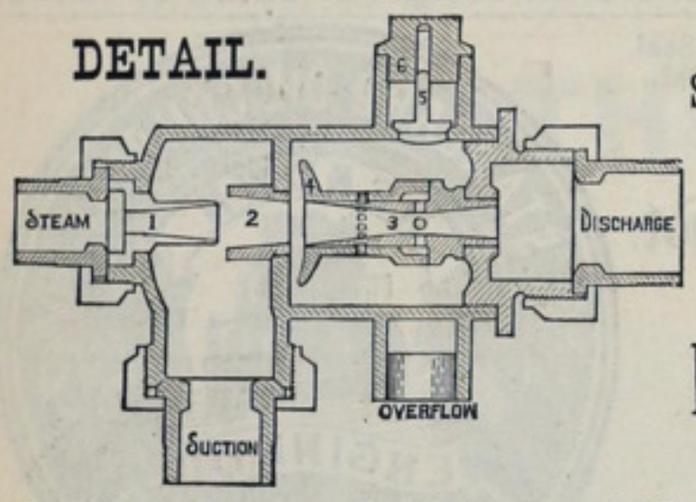

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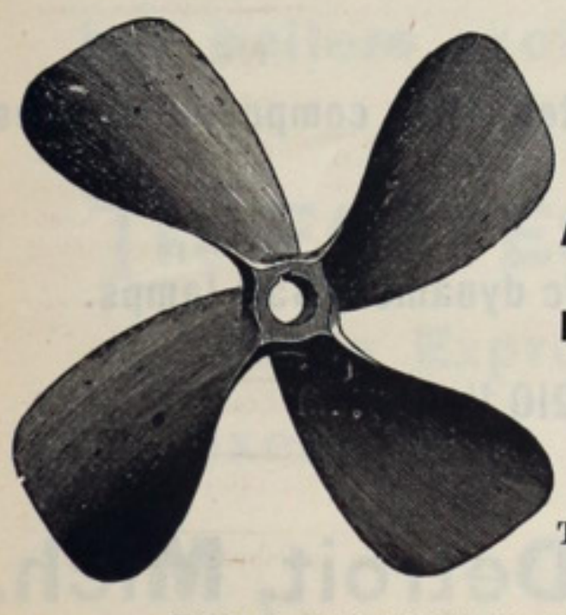

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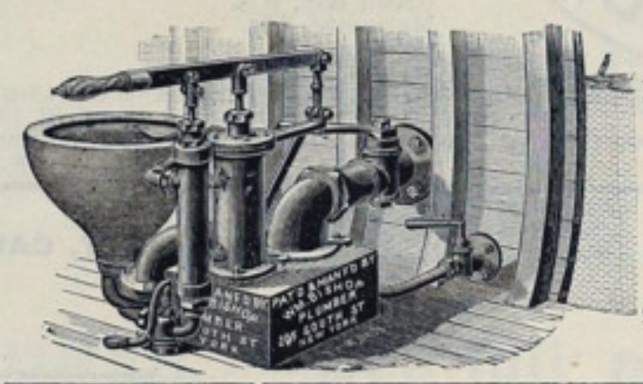

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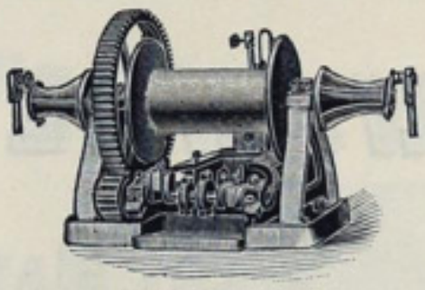

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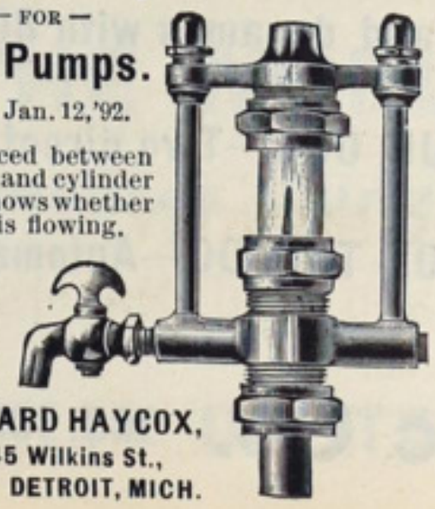

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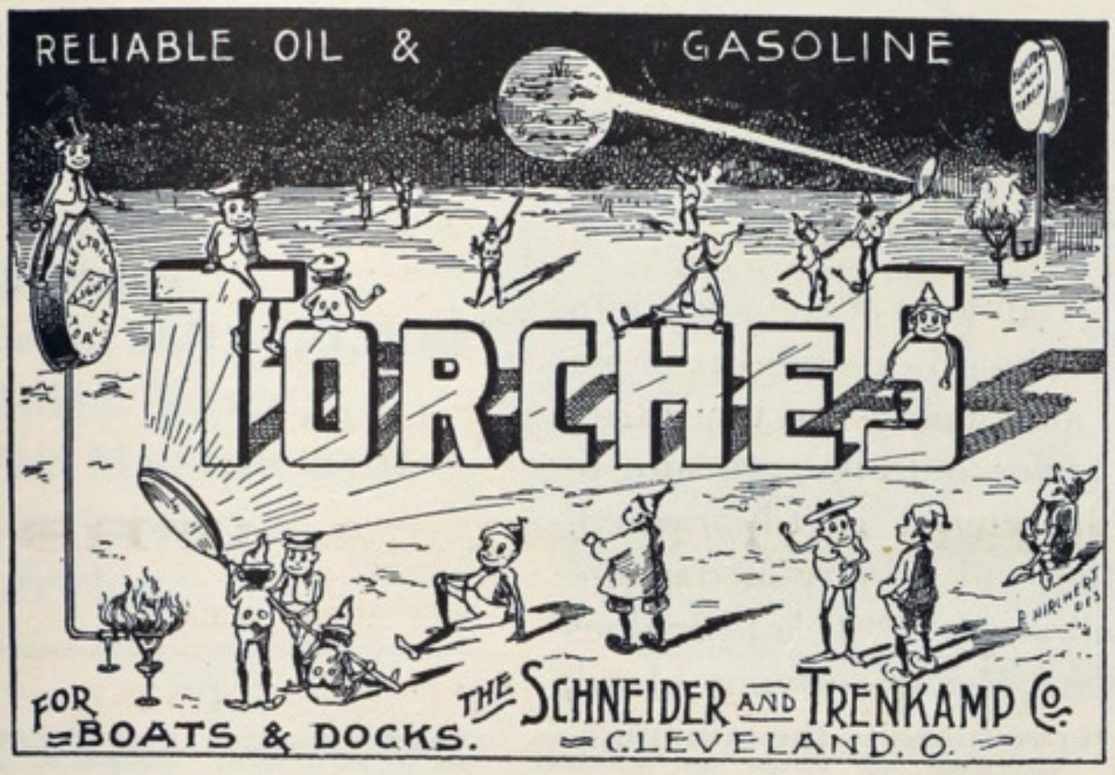

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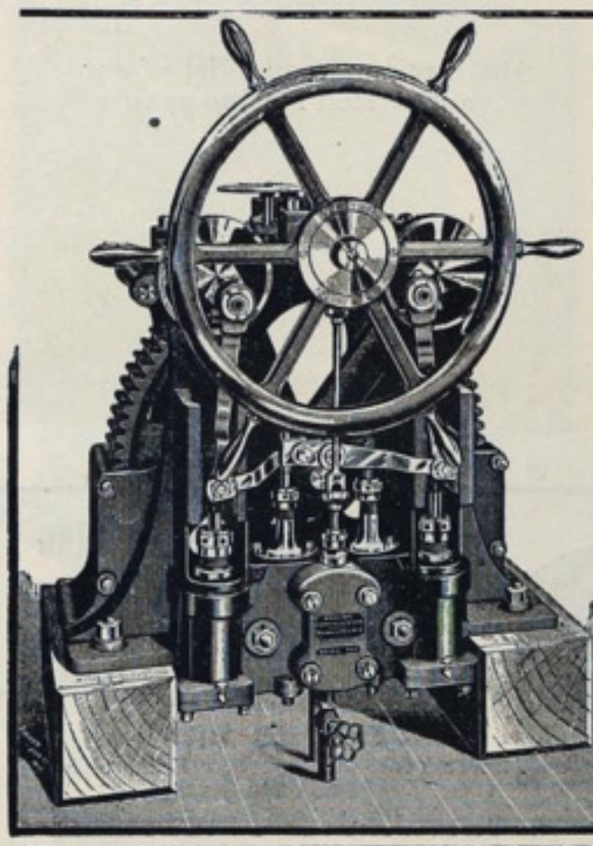

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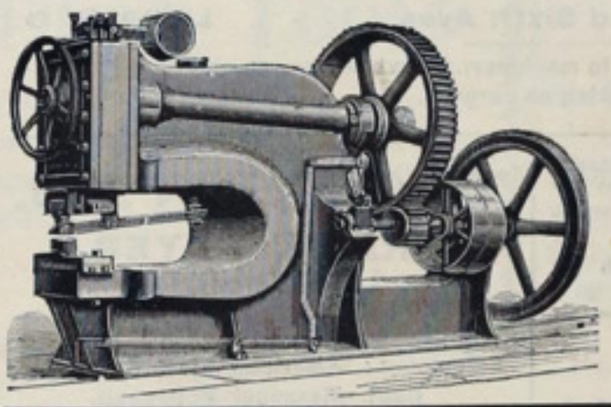

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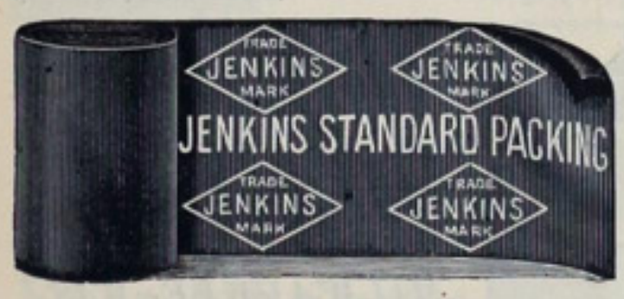

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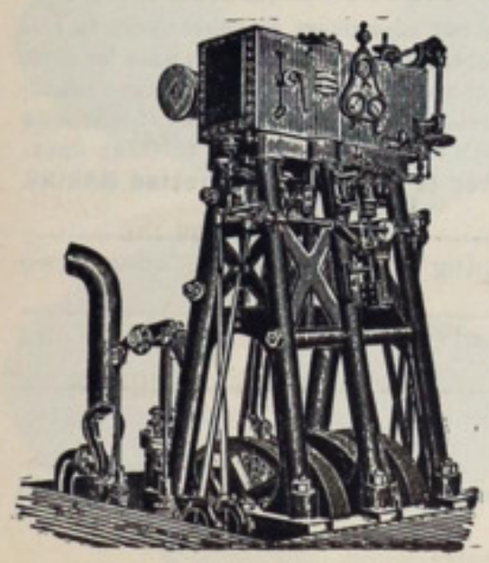

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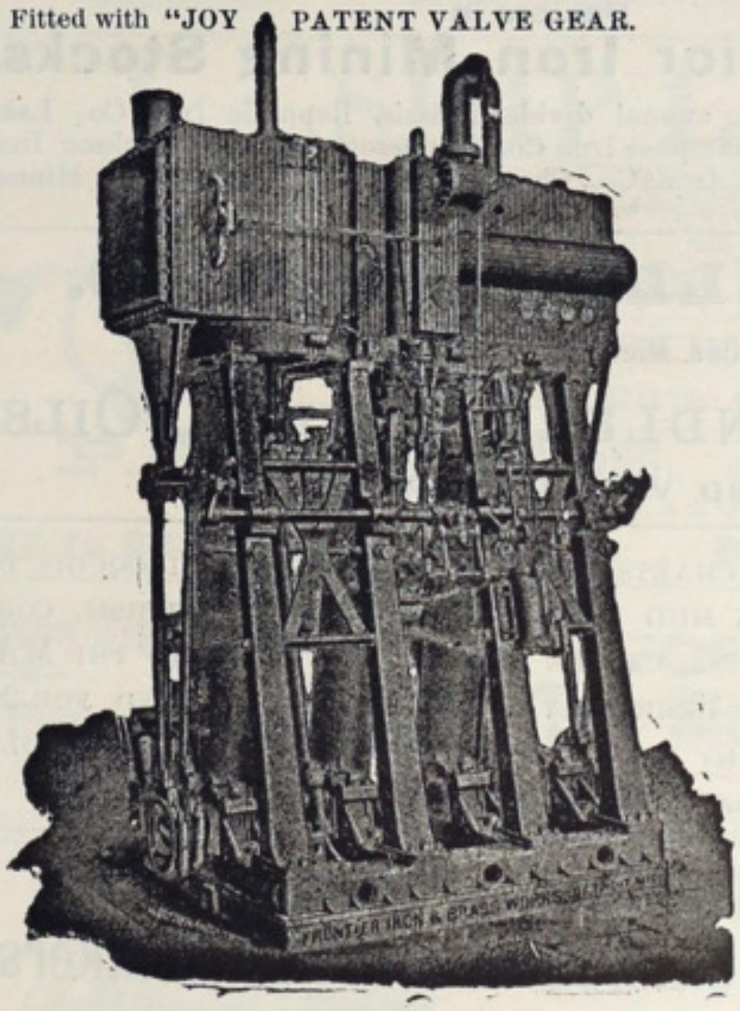

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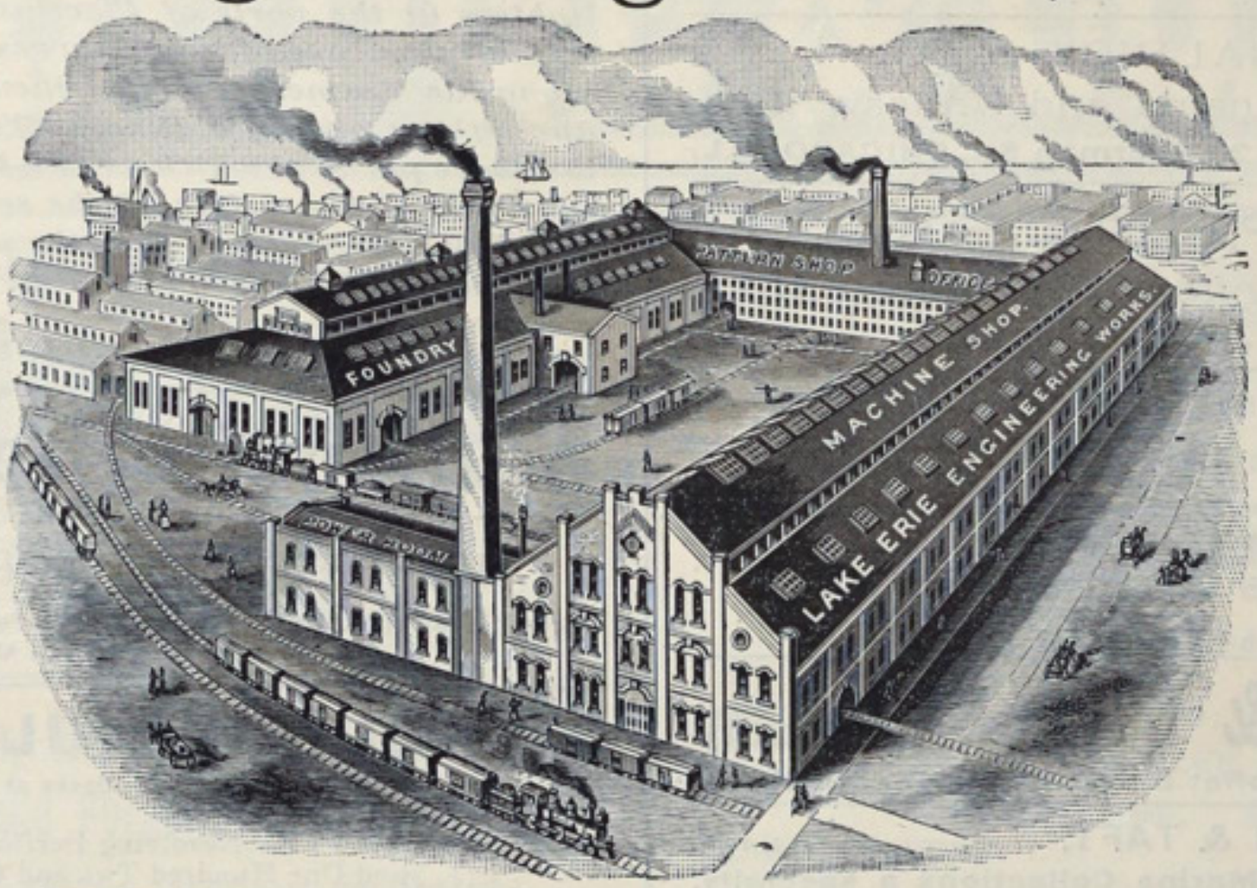

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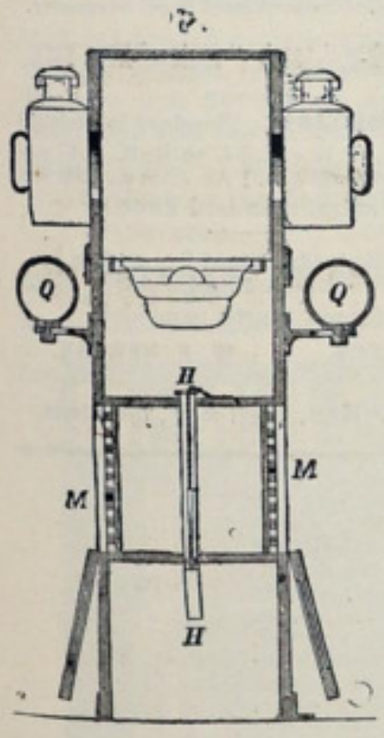

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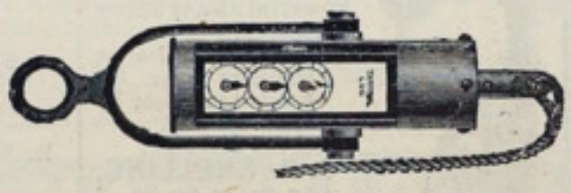

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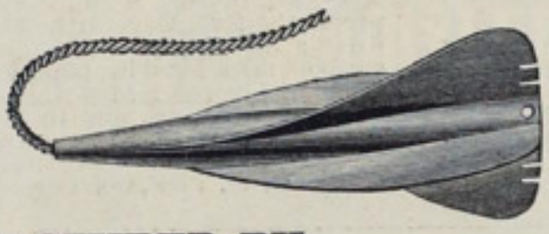

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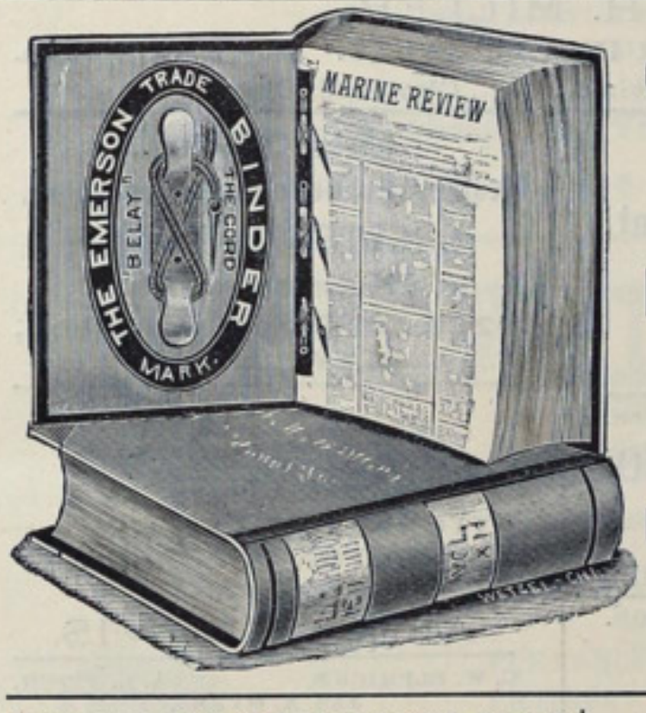

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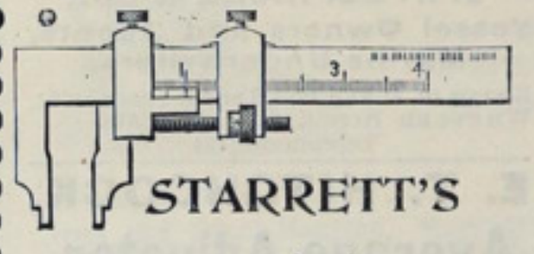

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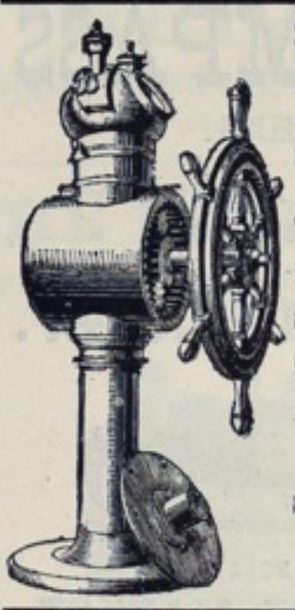

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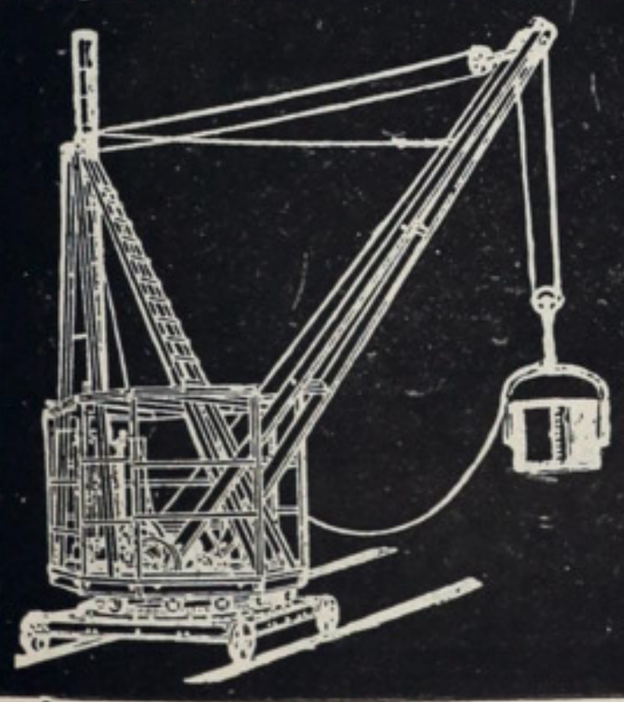

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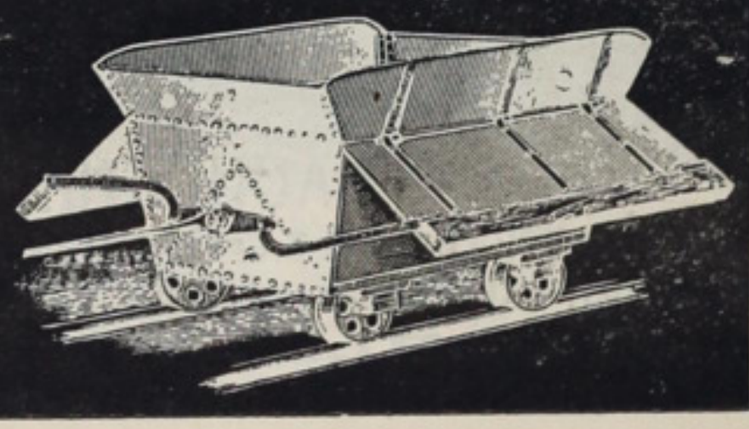

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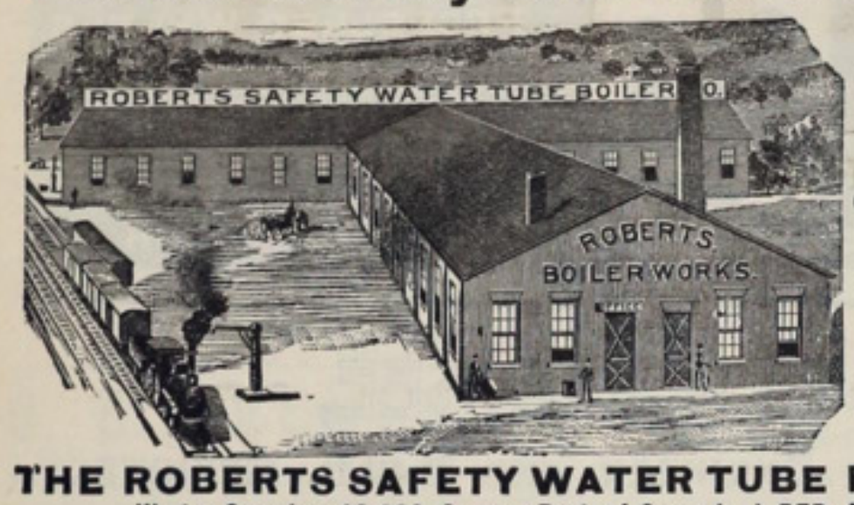

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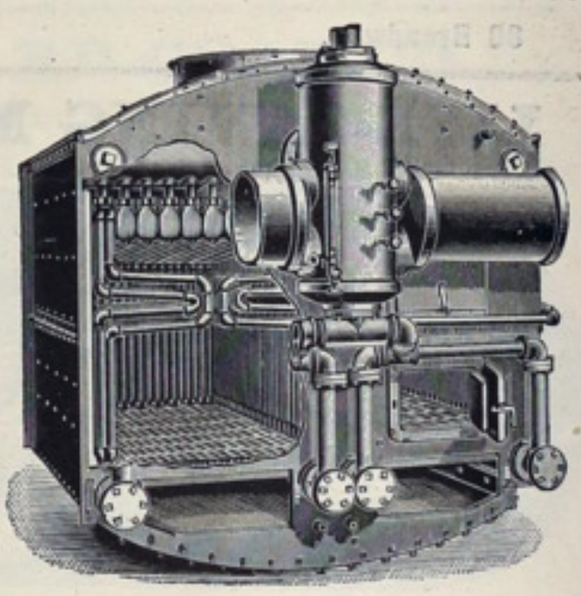

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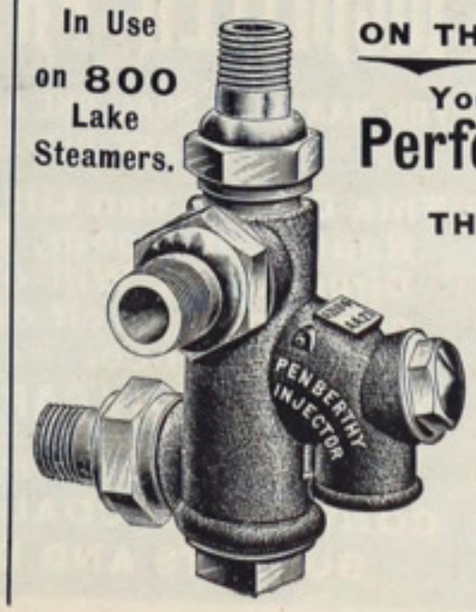

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